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AIR POLLUTION ABSTRACTS

U.S. ENVIRONMENTAL PROTECTION AGENCY
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This periodical is published to inform air pollution personnel of the Environmental Protection Agency (EPA), and others, of technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given. Translations are cited with their sources whenever possible. The subject fields are as follow: Emission Sources; Control Methods; Measurement Methods; Air Quality Measurements; Atmospheric Interactions; Basic Science and Technology; Effects-Human Health; Effects-Plants and Livestock; Effects-Materials; Economic Aspects; Standards and Criteria; Legal and Administrative; Social Aspects; and General and Miscellaneous. All abstracts are listed under one of the above subject fields. A subject and author index are included. This issue contains abstracts 10232 - 11083.

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AIR POLLUTION ABSTRACTS

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Personal authors (maximum of five per document) are arranged alphabetically. The names are presented last name first. The title of the document is indented below the author's name; when the author was the first author of a title, it is designated by an asterisk. The Abstract Number follows on the next line.

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INTRODUCTION

This periodical is published to inform personnel of the Environmental Protection Agency's Office of Air Programs (OAP), and others, of technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given.

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As another service, abstracts of all literature in APTIC (not just in a single issue of this periodical) on any subject related to air pollution will be provided free of charge upon request. APTIC can search information more recent than that in the current issue of this periodical because of the lapse of time entailed by editorial, make-up, and printing work. More than 1400 subject index terms are available for such searching—more than those included in the subject index in each issue.

SUBJECT FIELDS AND SCOPE NOTES

1. EMISSION SOURCES

Information pertaining to an industry, process, or material associated with air pollution. Documents in this category are concerned primarily with characteristics of a specific class of emission sources including types, rates, industries; secondary coverage may include effects, control methods, etc.

2. CONTROL METHODS

Includes equipment and both specific source control and general abatement efforts. Included are documents describing the operating principles, design, operation, efficiency, etc., of equipment and methods of removing pollutants. The scope of the document can vary from a device for a specific source to an approach applicable to an entire industry—e.g., automobiles.

3. MEASUREMENT METHODS

Includes equipment as well as methods. Confined to development, testing and evaluation of pollutant determination methods (sampling, analytical, monitoring) and equipment, as such. Data obtained by use of methods in specific applications are placed in the applicable subject categories.

4. AIR QUALITY MEASUREMENTS

Pollution measurements in the ambient air, generally related to specific geographical locations, such as area surveys. Also includes general reviews of area situations and emission source inventories.

5. ATMOSPHERIC INTERACTION

All chemical and physical phenomena occurring in the atmosphere. Included is material on dispersion, air pollution forecasts, meteorological effects, topographical effects, photochemical reactions in the atmosphere, etc. Laboratory studies of photochemical reactions are assigned to Basic Science and Technology.

6. BASIC SCIENCE AND TECHNOLOGY

General discussions or data compilations for the basic physical and chemical properties of pollutants. Theoretical and laboratory studies on related chemical and biological reactions and mechanisms. Mass transfer and other basic knowledge related to process engineering applications in emission control or abatement. Excludes photochemical studies in the atmosphere and biochemical studies related to effects of air pollution.

7. EFFECTS—HUMAN HEALTH

Covers medical and epedemiological studies; biological effects other than those on plants and livestock produced by air pollutants; laboratory animal experiments.

8. EFFECTS—PLANTS AND LIVESTOCK

Effects on vegetation—crops, trees, other plants—and on livestock as distinguished from laboratory experimental animals.

9. EFFECTS—MATERIALS

Deterioration, corrosion, etc., of physical materials, buildings, and structures.

10. ECONOMIC ASPECTS

Economic implications of air pollution and its control, e.g., economic losses from pollution damage, and costs of control programs or equipment in general.

11. STANDARDS AND CRITERIA

Recommended or adopted guides, criteria and standards for allowable emission limits or pollutant concentrations, air quality, equipment characteristics, and fuels.

12. LEGAL AND ADMINISTRATIVE

Legal aspects include legislation, ordinances, rules, litigation, hearings, decisions, etc. Administration covers administrative and miscellaneous information concerning control agencies and control and research programs. Typical topics are personnel, budgets, contractural activities and program descriptions.

13. SOCIAL ASPECTS

Sociological and psychological aspects such as social attitudes, public opinion studies, public relations, and public information.

14. GENERAL AND MISCELLANEOUS

Reviews of general problems, trends and background. Documents not assignable to other categories.

ABSTRACT BULLETIN

EMISSION SOURCES

10232 APTIC NO. 27898

Bakacs, Tibor

ENVIRONMENTAL HYGIENE ITS PRESENT EVALUATION AND PROSPECTS IN HUNGARY.

Acta Med. (Budapest), 24(3):237-262, 1967. 15 refs.

The tremendous rate at which technological development is proceeding has brought many advantages that render man's life easier, but has on the other hand - produced also apparently irreconcilable contradictions. Technological progress is too fast to be followed by the adaptation of man. The threatening dangers of increasingly artificial environment constitute no special problems of hygiene but form an integral part of the complex problem of urbanization. The increasing saturation of our environment with biologically active substances is a direct consequence of accelerated urbanization. Noxae caused by detergents, plastic substances, and by the chemization of agriculture belong to this category. We must try to select, in the course of chemization, only those substances (or else, to choose those from the existing ones) that while useful for the yield and efficacy of the people's economy do not increase the biological load that burdens man in his more and more artificial urban or urbanizing environment. Specific recommendations are as follows: that only soft detergents meet the specifications for avoiding biological damage; that plastics, used as water flocculants, in wall paints and plumbing fixtures, for household devices, and so forth, be selected from compounds with low water solubility so that they will not poison by contact; and that the problems of chemization, which are difficult and complex, be given special attention. Hungary will prohibit the use of chlorinated hydrocarbons as of January 1, 1968. The best approach to maintaining a deliberate, positive ecological balance is by biological means, such as causing artificial microbiological epidemics to attack parasites.

10233 APTIC NO. 27900

Smith, William M.

EVALUATION OF COKE OVEN EMISSIONS.

Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 10p., 1970. 3 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 63rd, St. Louis, Mo., June 14-18, 1970, Paper 70-94.)

The composition and effects of coke oven emissions are evaluated. The polynuclear aromatic content of coke oven volatiles is determined by placing the sampling unit near the larry car. Unsubstituted polynuclear aromatics constitute between 2-3% of the collected volatiles or between 4-6% of the benzene soluble portion of the collected volatiles emitted during the charging operation. The investigation of different types of control equipment installed at various coke oven plants in the Ruhr valley showed that the fume control equipment on the larry car was not operable a significant part of the time; when the equipment was working satisfactorily, employee exposures were less than with the uncontrolled larry cars. Studies were also conducted to determine the most non-powered, half-mask respirator for use in reducing the exposure to coal tar pitch volatiles. Mechanical-filter respirators were more effective than the chemical-cartridge respirators. Further research on the characterization of coke plants emissions included the development of a more refined method to permit the quantitative measurement of 4 and 5-ring polynuclear aromatic hydrocarbons, the determination of polynuclear aromatic hydrocarbons and composition of coal tar pitch volatiles at a number of widely scattered coke plants, and the determination of the polynuclear aromatic hydrocarbon content of samples taken at various distances from coke oven batteries.

10234 APTIC NO. 27906

Perry, Harry

METHODS OF REDUCING EMISSION OF OXIDES OF SULFUR FROM COAL.

Proc. Am. Power Conf., vol. 27:107-113, 1965. 2 refs.

Tables are presented of the sulfur content of coals used by electric utilities burning 201 out of 209 million tons of coal consumed in 1963 and of the sulfur content of coal used by electric utilities, as classified by state, in the last three months of 1962. The average sulfur content of coals determined from the tables is 2.53 and 2.28%, respectively. Because of the resulting plume and the reduced bouyancy of the gases, scrubbing process that discharge a cool supersaturated gas are not acceptable at power plants. Three higher-temperature processes now being tested are the Bureau of Mines alkalized alumina process, the Reinluft process, and the Pennsylvania Electric process. Advantages claimed for the first are the low pressure drop of the flue gas during absorption, operation over the range 250-650 F, and the ability to produce elemental sulfur as the end product. The Reinluft process is based on the adsorption of SO_2 by activated char and yields sulfuric acid, as does the Pennsylvania Electric process which involves the catalytic conversion of SO_2 to SO_3. Further information is needed on key process variables that influence the economics of these methods and on the market values of the by-products.

10235 APTIC NO. 27929

Silverman, Leslie and S. I. Husain

A STUDY OF NITROGEN OXIDE CONCENTRATIONS DURING ARC WELDING.

A.M.A. Arch. Ind. Hyg. Occupat. Med., vol. 3:135-146, 1951. 10 refs. (Presented at the American Industrial Hygiene Association, Annual Meeting, 10th, Detroit, Mich., April 7, 1949.)

Welding experiments were conducted to determine the kinetics of the formation of nitrogen oxides in steel-welding operations. The factors investigated included the effects of air recirculation, wit and without filtration of iron fume, the use of bare and coated electrodes at various voltages, and the effects of fume concentrations. During arc welding, nitrogen dioxide concentration increase in proportion to the number of electrodes burned. Bare rods produce much more NO2 than coated rods, but not proportionatel greater amounts of total nitrogen oxides. After welding ceases, total oxide and NO2 concentrations decrease in proportion. Nitric oxide concentrations are approximately equal to NO2 concentrations during and following welding of coated electrodes. In the case of bare electrodes, NO2 concentrations are approximately twice the NO concentrations. There is no indication from the study that serious concentrations of NO2 would result from the recirculation of filtered fume air in a room of adequate volume. The maximum NO2 concentration depends principally on the number of electrodes used and the voltage and amperage. Under proper welding conditions only small amounts of NO2 are formed. These amounts remain stable or decrease in the presence of comparable concentrations of iron fume. The amounts of fume are equivalent to those obtained in filtered air. (Author conclusions modified)

10236 APTIC NO. 27930

Roe, J. W.

GASES AND FUMES PRODUCED IN FUSION WELDING AND CUTTING.

Ann. Occupational Hyg., vol. 2:75-84, 1959. 16 refs.

What is known about the nature and amount of fumes and gases evolved from oxyacetylene welding, arc welding, oxygas cutting, and arc cutting is summarized. Arc welding presents the greatest range of possible toxic by-products, with the nature of the fumes and gases evolved depending to a large extent upon the means adopte to protect the molten weld from the atmosphere. Thus, when the electrode consists of a bare steel rod, the fume consists of iron oxide with more or less manganese oxide; nitrogen oxides are also formed from the air as a result of the high temperature and the ultraviolet radiation from the arc. For a given type and size of electrode, the total weight of fume evolved depends upon the rate at which it is melted down (i.e. upon the current). The quantity o nitrogen oxides and ozone produced depend upon the energy dissipated in the arc and upon the degree of its exposure; thus deep penetration welding and welding with a bare electrode produce larger quantities while the so-called 'dead soft' electrodes, in which the end of the rod is in a cup formed by the unmelted coating produce less than average. Types of electrodes, constituents of the coating, and notes on the fumes evolved are presented tabularly Small quantities of gaseous fluorine compounds are evolved during the normal use of low hydrogen electrodes and these quantities become appreciable if abnormally high welding currents are employed. The rate of production of nitrogen oxides is mentioned, including their toxicity. Submerged arc welding and the fumes which may be evolved are also indicated. Fumes formed from inert gas shielded welding are cited. The vapor of trichlorethylene yields phosgene both directly as a result of photochemical decomposition and indirectly by reaction with ozone. Maximum allowable concentrations and the control of nitrogen oxides, fumes, and ozone are discussed. Good ventilation is indicated.

10237 APTIC NO. 27931

Powell, M.

TOXIC FUMES FROM SHOTFIRING IN COAL MINES.

Ann. Occupational Hyg., vol. 3:162-183, 1961. 108 refs.

Available evidence shows that the most important gases produced by detonation of explosives are carbon monoxide and nitrogen oxides. The nitrogen oxides of significance are nitric oxide and nitrogen dioxide; these constitute what are known as 'nitrous fumes.' Results of recent work indicated that NO2 in concentrations below 42 ppm caused no deaths or pulmonary damage in lower animals. Lung damage was observed following long-term exposures to nitrous fumes higher than 5-9 ppm. Evidence from industrial experience is conflicting: Russian workers cite pulmonary and hematological changes following exposure for long periods to only 2-6 ppm, but some American authorities consider that 70 ppm is the threshold of harmful concentration. Application of the results of animal experimentation and industrial experience to coal-mining conditions is difficult. First, all underground measurements have been reported in terms of total oxides of nitrogen. They thus include the less toxic NO. Second, evidence of the combined effect of CO and nitrogen dioxide suggests that effects may be seen at a lower level than with either gas alone. Third, there is some evidence that the toxicity of NO2 and CO increases with a rise in environmental temperature. Finally, there are other toxic agents present in gases from explosion whose long-term results are complex and obscure. Nevertheless, the concentrations measured underground appear to warrant further and wide investigations.

10238 APTIC NO. 27935

Smith, Ernest L.

CONCRETE CRYOGENIC STORAGE TANK FOR LNG AT TEXAS EASTERN'S TERMINAL.

American Gas Association, Inc., New York, Proc. Am. Gas Assoc. Operating Section Conf., 1966, vol. 2:602-615.

Some of the design features and construction techniques are summarized for a liquefied natural gas plant proposed to be constructed near the eastern terminus of Texas Eastern's existing pipeline system. The storage plant is designed to liquefy approximately 9000 Mcf/day of natural gas, including the reliquefaction of about 1500 Mcf/day of boiloff gas, while the vaporization plant has the capacity to return the natural gas to th pipeline system at a flow rate of 200,000 Mcf/day. Location of the LNG facility is considered. A molecular sieve unit will reduce the concentration of carbon dioxide and water vapor to a permissible level, and some heavy hydrocarbons and other impurities will also be removed. Use of the incorporated cascade cycle for liquefaction permits the utilization of a simpler piping system and few compressor cylinders than could be achieved with a standard cascade cycle. The 600,000 barrel capacity, internally insulated, pre stressed concrete tank is approximately 268 ft in diameter and provides for a liquid depth of 61 ft. A calculated steady-state boiloff rate of 0.06%/day of the tank volume is accomplished with eight inches of polyurethane insulation on the walls and floor and 12 inches in the tank dome. Tank instrumentation will include sensors for measuring temperature, earth pressure, concrete strain, vertical rod strain, pre-stress wire strain, and floor-wall radial movement. Operation of a prototype tank is discussed, as well as a digital-computer technique which was developed to simulate the size and geometric configuration of large commercial tanks. Several types of vaporization system are under consideration. Conventional safety relief valves, vent systems, ultraviolet flame detectors, and other safety apparatus will be provided.

10239 APTIC NO. 27942

Hammar, C. G. B. and H. C. I. Arne

THE SODA FURNACE AS A SOURCE OF AIR POLLUTION.

Preprint, Canadian Pulp and Paper Assoc., Technical Section, and Chemical Inst. of Canada, p. 59-60, 1970. (Presented at the Canadian Wood Chemistry Symposium, 3rd, Vancouver, B. C., June 24-26, 1970.)

The principles of a computer method to obtain complete material balances from a relatively closed chemical recovery system in a Swedish kraft pulp mill are briefly outlined. The closed system is necessary because of recent stringent air pollution regulations. In computing soda furnace sulfur losses from such balances, data from a standard sulfate mill and a sodium bisulfite mill are summarized in a linear equation showing the yield of sulfur in the soda smelt as a function of the sulfur to sodium ratio in the feed to the furnace. With equations and data available for each process stage, material balances are made by a trial-and-error method, assuming a preliminary value for the sulfidity of the white liquor and correcting it until the sum of sulfur losses equals the sulfur in the feed. As a demonstration, calculations are given for several modifications of a standard 100,000-ton sulfate mill. To control furnace sulfur losses, studies based on pyrolysis reaction indicate that the highest sulfur retention is obtained if the black liquor is heated slowly in the furnace. Efficient process control can be achieved only by considering the furnace as part of the total sulfate process.

10240 APTIC NO. 27943

Romanovsky, J. C.

CRITERIA AND STANDARDS RELATING TO TRANSPORTATION AND ITS EFFECTS UPON AIR POLLUTION CONTROL.

Preprint, Air Pollution Control Assoc., Mid-Atlantic States Section, 13 p., 1970. (Presented at th Air Pollution Seminar, Harrisburg, Pa., Oct. 8-9, 1970.)

The Department of Health, Education, and Welfare has issued four ai quality criteria documents that impinge directly on the problem of transportation and air pollution. These documents deal with particulate matter, carbon monoxide, hydrocarbons, and photochemica oxidants. Particulates in the respiratory tract may produce injury separately or by acting in conjunction with gases. Lead and polycyclic organic matter are more specific components of the unclassified particulate matter common to urban atmospheres. Carbon monoxide is absorbed through the lungs and reacts primarily with the hemoglobin of red blood cells, thus decreasing the oxygen- carrying capacity of the blood. Levels common to polluted atmospheres have been related to the impairment of time-interval discrimination and visual acuity. Photochemical oxidants cause irritation of mucous membranes, damage to vegetation, and deterioration of materials. They affect the clearance mechanism of the lungs and alter resistance to respiratory bacterial infection. They have been implicated, too, as accelerators in the aging process. Hydrocarbons serve as precursors of other compounds that result in photochemical smog. Nitrogen oxides are also essential ingredients of the photochemical smog system. They have been associated with increased incidences of acute bronchitis and damage to vegetation and materials.

10241 APTIC NO. 27970

Beavon, David K.

PREVENTION OF AIR POLLUTION BY REFINERY SULFUR PLANTS.

Preprint, 15p., 1971. 1 ref. (Presented at the Japan Petroleum Institute, Meeting on the Desulfurization and Reclamation of Waste Gas, Tokyo, Feb. 26, 1971.)

A new process, the Beavon Sulfur Removal process, reduces the sulfur dioxide content of refinery sulfur plant tail gas to below 250 ppm, the level required for a plant efficiency of about 99.92%. The system is based on hydrogenation and cooling of the tail gas followed by the wet oxidative extraction of the pure hydrogen sulfide formed by hydrogenation. A cobalt molybdate catalyst is used to speed the hydrogenation reaction, and either the Stretford process or the Takahax process is suitable for the oxidative extraction. Both processes function well at atmospheric pressure, use nontoxic chemicals, and produce a high-quality sulfur while purifying the gas to a remarkable degree. The quantity of sulfur recoverable is minor, however, so the Beavon process is offered strictly as a needed remedy for a serious air pollution problem. The total investment, including royalty, is about the same magnitude as the parent sulfur plant, with a large part of the investment going for the extraction system.

10242 APTIC NO. 27972

Okubo, Shigeyuki

INCINERATOR.

(Jinai shokyakuro). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 45-8394. 2p., March 25, 1970. (Appl. July 30, 1966, claims not given).

A three-chamber incinerator is described that permits the odorless combustion of garbage and similar water waste. From top to bottom the chambers are a heated air outlet chamber, a burner chamber, and an incinerator chamber. The incinerator and burner chambers are separated by a lattice rostrum through which the burner chamber is able to dry and complete the combustion of garbag as it passes through a hot air circulation channel, located between the inner and outer walls of the incinerator, to the hot air outlet chamber. Odorous gases generated in the incinerator are passed to a gas discharge pipe and deodorized by water jets prior to their discharge from a tap aspirator.

10243 APTIC NO. 27973

Yoshihara, Akira and Majjiro Sato

DRYING/INCINERATING EQUIPMENT FOR MOIST WASTES.

Gansui haibutsu kanso-shok-yaku sochi). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 45-8950. 3p., March 31, 1970. (Appl. July 28, 1967, claims not given).

A new incinerator is provided with a dryer chamber to insure the efficient incineration of wet refuse. The main unit, a tubular furnace, has a funnel-like kiln with a tubular tower at its bottom. This tower, which is closed at the top, opens into the burner combustion chamber located under the kiln. A funnel-shape hopper under the burner is connected to the inside of the kiln into which refuse is introduced by a belt conveyor. The kiln is also provided with a secondary air pipe equipped with an air spray nozzle. The belt conveyor is housed in the dryer chamber housing, which is also connected to a smoke suction duct. When the burner in the combustion chamber is ignited, flames and/or high temperature gas penetrate into the kiln through flame holes. The hot gas then passes to the dryer chamber where it dries the refuse on the belt conveyor. As the refuse falls from the conveyor into the kiln, it is contacted with the air jets and thus is evenly distributed in the kiln.

10244 APTIC NO. 27980

Callahan, Joseph M.

AIR POLLUTION CONTROL-SYSTEM FOR IN-USE CARS.

Automotive Ind., 144(5):20-21, March 1, 1971.

A prototype speed-control exhaust recirculating system for automobiles now in circulation first reduces emissions by retarding engine ignition-timing until the car reaches 28 mph. Then a mechanical speed control, using a flyball governor, simultaneously advances the ignition timing and begins recirculating some of the exhaust gases back to the engine. The system comprises tubing tapped into the exhaust pipe between the manifold and muffler, a finned heat exchanger to cool the gases, a vacuum-operated valve with a return spring, an orifice to meter the exhaust gas flow, and an adapter plate to admit the gas to the intake manifold below the carburetor. When produced in quantity, the system should retail for about $100.

10245 APTIC NO. 27986

Alberte, Tony

ENGINE PROGRAMS EXAMINE DIESEL SMOKE, NOISE, ODOR.

Diesel Gas Turbine Progr., 37(1):28, Jan. 1971.

The Caterpillar Company is examining several approaches to the smoke control problem of diesel engines from the basic premise that smoke can be reduced only by limiting fuel input or by increasing air input or a combination of both. Work is being carried out on turbocharging, blower turbocharger combinations, and air/fuel ratio controls. An air/fuel ratio control and modified engine combustion system have been installed on a truck. Odor control and noise control activities are also under investigation and will be examined in future issues.

10246 APTIC NO. 28001

Sakaki, Kotei

PRESENT STATE AND FUTURE PROBLEMS OF WASTES DISPOSAL.

(Haikibutsu shori no genjo to kongono kadai). Text in Japanese. PPM (Japan), 2(3):50-56, March 1971.

Today's home wastes or rubbish consisting of such combustibles as trash, kitchen garbage, and plastics, such non-combustibles as metal, glass and ceramics, and water content, amounts to 913 g/day per capita in Tokyo (1967), and 723 g/day in Osaka (1967) as compared with 2085 g in New York (1963) and 952 g in London (1966). Japan's home rubbish is characterized by a high water content, 40-60% against 20-30% of its American and European counterparts, thus giving lower calorific value, 900 to 1400 kcal/ kg as compared with that of its American and European counterparts, estimated at 1100 to 1600 kcal/kg. Another characteristic of Japanese home rubbish is high percentage of plastics content, which was 9.7% in Tokyo in 1969, against the European average of 1-2%. The quantity of industrial wastes was estimated at 1,074,900 tons a day as of the end of 1967. During 1968, 48.3% of the home rubbish (62,005 t/day) was disposed of by incineration, 36.2% by use for land reclamation, and 12.5% by individual home disposal. The high percentage of the incineration disposal is due mainly to Japan's scarcity of suitable sites for reclamation and to the first (1963-1967) and second (1967-1971) five-year environmental sanitation promotion programs under which installation of incineration facilities have been vigorously pushed forward. The percentage is expected to reach 75% in fiscal 1971. In connection with the incineration, however, the problem of deleterious gas generated by incineration of polyvinyl chloride and other plastics has recently become more acute with the recent drastic increase in the plastics wastes. It is, therefore, urgently required that new incineration devices be developed to cope with this problem. Chars and similar incineration residues amount to at least 15-20% of the raw wastes treated. The use of such residues for reclamation purposes, still remains significant. Composting disposal is lagging in Japan, representing only 1.3% of the total wastes treated by this method, despite the fact that fertilizers produced by composting are superior to chemical fertilizers. This can be attributed to their poor domestic marketability and incomplete techniques for separating noncombustibles from the waste.

10247 APTIC NO. 28009

Zalman, Solomon

ANTI-POLLUTION INCINERATOR.

(Assignee not given.) U. S. Pat. 3,548 761. 4p., Dec. 22, 1970. 7 refs. (Appl. Dec. 26, 1968, 7 claims).

Conventional devices for controlling air pollution from incinerator are based on the use of water sprays to precipitate smoke in exhaust gases or fluid filter tanks for scrubbing smoke. Such devices are not effective in reducing smoke pollutants and further require an assortment of unreliable components. The present incinerator uses a series of upwardly directed steam jets to scrub exhaust gases and thus removes a substantial portion of smoke particles. The jets, which are mounted against the walls adjacent to the opening of the chimney, are supplied with steam from an independent source such as a steam generator. The incinerator is also provided with a gas burner and an air manifold to start and maintain the incineration of the refuse articles, a timeclock for automatically operating the incinerator at preselected times, and a temperature control. The steam jets of the invention are adoptable for use with fuel burning equipment commonly employed by heating and power generating plants.

10248 APTIC NO. 28038

Johnstone, H. F.

PROPERTIES AND BEHAVIOR OF AIR CONTAMINANTS.

Ind. Med. Surg., 19(3):107-115, March 1950. 19 refs.

Some of the obnoxious gases known to be present in industrial atmospheres and their physiogogical effects observed at low concentrations are described, and their threshold values indicated. Chief sources of sulfur dioxide in industrial cities are the combustion of fuels, smelting operations, refineries, and chemical plants. SO2 in the air is known to be injurious to vegetation above 0.5 ppm, to contribute extensively to the corrosion of buildings and metal objects, and to cause irritation of the throat at 10 ppm. Hydrogen sulfide is one of the constituents of the waste gases from pulp mills, and is prevalent around sewage disposal plants, gas plants, and mine seepages. It rapidly discolors lead paints. Sources and effects of sulfur trioxide or sulfuric acid mist and other sulfur compounds are also indicated. The principal methods for treating gases containing SO2 are absorption in a liquid absorbent followed by regeneration by heating, neutralization with ammonia and recovery of ammonium sulfate, neutralization by lime slurry, absorption in water or aqueous solutions, and recovery of hydrogen sulfide. Formation of the oxides of nitrogen and its control are mentioned; as well as ammonia. Hydrogen fluoride may be produced from aluminum plants and phosphate fertilizer plants, and causes irritation of the throat, coughing, fluorosis in cattle, and mottled teeth in man. Sources and effects are included for hydrogen chloride, organic chlorides, carbon dioxide and monoxide, exhaust gases, peroxides, and zone. Optical properties of aerosols and their effect on visibility are discussed, as well as their deposition, coagulation, stability, diffusion in the atmosphere, electrostatic properties, and physiological effects. In many ways the physical properties of aerosols are more important in atmospheric pollution than the chemical nature of their constituents.

10249 APTIC NO. 28039

Starkman, Ernest, Robert Sawyer, and Laurence Caretto

AUTO EMISSIONS. PAST, PRESENT, AND FUTURE.

Calif. Engr., 1970:36-37, 40-41, March 1970. 1 ref.

Nationwide estimates show the automobile contributing 61% of the total pollutants; this includes 93% of the carbon monoxide, 46% of the nitrogen oxides, and 63% of the hydrocarbons. In the San Francisco Bay Area, automobiles contribute 78% of the CO, 66% of the nitrogen oxides, and 49% of the HC, while in the Los Angeles Basin they contribute 97%, 66%, and 71%, respectively. Exhaust emissions, crankcase blowby, and evaporative emissions are mentioned. California air pollution laws for motor vehicles are indicated, as well as emission standards. Control of the present reciprocating piston engine and alternative power sources are considered. While the first control devices used by Ford and General Motors included an air pump which added air to the exhaust gases as it left the exhaust valve, future model year cars were able to meet emissions requirements by running on leaner mixtures, using slightly lower compression ratios, and modifying the combustion chamber design. Future control of current gasoline engines will be based on some kind of exhaust reactor for control of hydrocarbons and CO. Catalytic devices and a homogeneous oxidation process are indicated. In discussing the simultaneous control of CO, NO, and HC, it is always necessary to keep in mind that changes which reduce CO and hydrocarbons usually increase NO and vice versa. Although the Wankel engine is a new powerplant from the standpoint of mechanical design it still employs the basic Otto cycle. In addition, the nature of the combustion process in this engine makes the uncontrolled version of the engine a worse hydrocarbon emitter than its conventional piston engine counterpart. Difficulties with the gas turbine are that it loses efficiency as the size of the powerplant is decreased and the materials and fabrication required for it make its overall cost more expensive. However, it is now at the stage where it can compete with the diesel engine for heavy trucks and buses. Emissions are indicated for the Wankel engine, gas turbines, the Stirling engine, and the steam car. Difficulties with the electric powered car are indicated.

10250 APTIC NO. 28043

Vaughan, Harold E.

THE TRANSCO LNG PROJECT BECOMES A REALITY.

American Gas Association, Inc., New York, Proc. Am. Gas. Assoc. Operating Section Conf., 1966, vol. 2:663-672.

The final construction phase, commencement of operation, and operating experiences are described at Transcontinental Gas Pipe Line Corporation's liquefied natural gas storage facility in the Hackensack Meadows of New Jersey. None of the start-up problems were considered really serious until initial cool-down of the storage container began, and there was seepage of water into the hole from several areas in the red shale section. The problem was solved by drilling water wells around the periphery of the containe and lowering the water table in the immediate area. Due to numerou problems in the gas purification section and in the ethylene refrigeration system, the rate of gain in storage has been slower than anticipated. An improperly adjusted timer and switching control in the dehydration unit coupled with insufficient instrumen air permitted wet gas to enter the liquefaction section for about 15 minutes. An increase in pressure drop across one of the exchangers was noted, and several times the plant had to be shut down for deriming. The amine pumps also tripped off, resulting in carbon dioxide riming of heat exchangers in the cold box. Most problems with the ethylene system have been traced to kerosene and methanol which had not been completely cleared of the system after the original liquid testing before start-up. A training program was conducted for new personnel over a period of several weeks, and the results have been good.

10251 APTIC NO. 28049

Yarnell, William T. and Alexander J. Turpin

MULTI-PURPOSE FURNACE WITH SMOKE AFTERBURNER.

(Buell Engineering Co., Inc., Lebanon, Pa.) U. S. Pat. 3,548,760. 16p., Dec. 22, 1970 2 refs. (Appl. Dec. 3, 1968, 28 claims).

Most multipurpose furnaces, especially those used in scrap yards to burn away impurities and recover salvage material or to melt nonferrous metals, are not designed for adequate smoke control An improved multipurpose furnace provides for combustion of substantially all of the smoke produced by various burning operations. The furnace is characterized by one or more combustion chambers, each of which has a smoke dome constituting 20-30% of the total volume of the chamber. The smoke dome, which occupies the uppermost portion of a chamber, is closed above and laterally except for an outlet to a smoke afterburner section. It effectively eliminates the possibility of smoke leaking through the charging door or of air coming in through the door. The smoke afterburner section is a passage designed for a generally helical or spiral flow of smoke. A burner is located in the passage to add heat to the smoke, and air or another oxygen-containing gas is introduced into the passage to support combustion of combustible components of the smoke. Baffles in the passage establish turbulence and mixing of the gases without substantially affecting the flow of smoke. Primarily 'clear gases' are discharged from the afterburner section. (Author abstract modified)

10252 APTIC NO. 28050

Peters, Michael C.

A NEW TOOL FOR POLLUTION STUDIES.

Test, 25(2-3):10-11, 23, March 1971.

A machine is described that delivers constantly controlled air at better than plus or minus 1/8 deg F for both dry bulb and hot bulb conditions to an internal combustion engine so that genuine engine performance can be evaluated. The machine employs a steam addition mechanism to control the dew point of air and electronically controlled nichrome wire-heaters to achieve a thermal control. With this type of precise air control, minute amounts of fuel additives can be studied for their effect on emissions. The device also permits minor changes in engine design to be evaluated, such as the use of different types of spark plugs and valves.

10253 APTIC NO. 28052

Baker, P. J. and B. E. A. Jacobs

FLUIDIC CHIMNEY REDUCES SMOKE POLLUTION HAZARD.

Elec. Eng. (Melbourne), 48(2):26-29, Feb. 1971. 2 refs.

Based on theoretical and laboratory studies of the heights to which chimney effluents rise when emitted in discrete vortex rings, a fluidic method of ring generation was developed and tested on a 20-ft high chimney. The flow of smoke was controlled by air pulses from an injector and ring terminator, the pulses supplied by way of electronically controlled solenoidoperated valves. The length of the ejector pulse was adjusted to give the correct slug of smoke at the chimney outlet to form a vortex ring. Between ejection pulses, the terminal pulse switches the flow of smoke to a storage vessel. Preliminary experiments indicated that the dispersion achieved by the vortex-ring method will help reduce local pollution. Moreover, the flexibility of the pulsing chimney, together with its smaller structural content, appear to offer significant economic advantages over conventional chimneys.

10254 APTIC NO. 28062

Heischkeil, Werner

ENERGY POWER SUPPLY OF IRONWORKS AS BEING INFLUENCED BY THE PROGRES OF ENGINEERING.

(Die huettenmaennische Energiewirtschaft im texhnischen Fortschritt). Text in German. Stahl Eisen, 91(5):250-256, March 4, 1971. 8 refs.

After 1950 the metal industry switched to heavy fuel oil for use in Siemens-Martin furnaces, while natural gas was introduced into the German metal industry as a fuel during the 1960s. At that time, oil was being used approximately 50% of the time. Coke oven gas from neighboring coking plants is also used in ironworks when it has been partially cleaned. Blast furnace gases are used in power plants. Possible price increases of coke should spur the development of metallurgical processes such as the direct reduction process which operates with gas, inexpensive coal, or oil. Processes using electric furnaces will be selected in small ironworks. Development of a high temperature reactor will also be promoted in view of the rising coke prices. However, the blast furnace process with subsequent oxygen lancing will remain the primary metallurgical process for some time to come.

10255 APTIC NO. 28065

Bellano, William

THE WORLD SITUATION FOR COKING COAL IN THE NINETEEN-SEVENTIES.

(Die Weltsituation fuer Okoskohle in den siebziger Jahren). Text in German. Glueckauf (Essen), 107(1):27-33, Jan. 1971.

The coal shortage which has become critical in 1970 is due mainly to the rapid growth of Japanese steel production and also to the rush on low sulfur coal for the reduction of sulfur dioxide emissions. Including coals of all types, it is estimated that the coking coal reserves throughout the world amount to more than 4.7 billion tons. More than 83% of this amount is bituminous anthracite or subbituminous coal. Almost 50% of the entire coal reserve is found in Asia, with one third found in the United States. However, 40% of the United States reserve is coking coal, with not more than 1.25% sulfur and 8.0% ash. Approximately 20% of the world reserve can be coked.

10256 APTIC NO. 28077

Soderholm, Lars G.

OXYGEN-STARVED INCINERATOR BURNS TRASH WITHOUT AIR POLLUTION.

Design News, 26(6):38-39, March 1971.

A new incinerator system meters air into a closed combustion chamber to control burning in a process that produces highly combustible carbon monoxide, rather than carbon dioxide, as a by-product. This metering of air results in self-regulation because as the furnace becomes hotter, the concentration of oxygen drops to automatically retard the rate of burning. Hot gases from the combustion chamber leave through a smaller secondary combustion chamber where they are mixed with air and ignited again by a gas jet. The secondary burning consumes most of the by-products from the first chamber, and stack emissions are well below air pollution standards. Volume reduction claimed for the incinerator ranges from 10-l to 250-l, depending on the composition of the trash and its degree of compaction.

10257 APTIC NO. 28078

Zmuda, Joseph P.

NEW POLLUTION SOLUTION: DUAL-FUEL CAL-GAS CAR.

Pop. Sci., 198(4):12, April 1971.

Most dual-fuel cars use natural gas or liquid petroleum gas as a primary fuel, switch back to gasoline when the gas runs out, and so are not true clean air vehicles. An experimental dual-fuel car is described which runs on compressed natural gas as a primary fuel and LPG as a backup fuel. The switch to LPG is accomplished automatically when the CNG line pressure drops to 50-75 psi. Although the car will run only 20 miles on a 365 cu ft tank filled with compressed methane, it does demonstrate the feasibility of CNG-fueled cars.

10258 APTIC NO. 28106

PRACTICAL NEW METHOD OF FLUID COMBUSTION POWERFUL FOR PLASTIC WASTE DISPOSAL.

(Jitsuyotekina shin ryudo nenshoho, purasuchhiku haikibutsu shori ni iryoku). Text in Japanese. PPM (Japan), 1(1): 47-48, Sept. 1970.

The Resources Research Institute of the Agency of Industrial Science and Technology is collaborating with the Government Mechanical Laboratory and the Tokyo Industrial Laboratory in a four-yr study of the technology of disposing of industrial plastic wastes. The Resources Research Institute will develop the disposal method and the Government Mechanical Laboratory the destruction technology. The Tokyo Industrial Laboratory is responsible for developing the technology for analyzing the gas emitted by the disposal process. The Agency of Industrial Science and Technology' Hokkaido Industrial Laboratory has already succeeded in developing a method for the continuous combustion of low-grade coal dust and plastic wastes in a fluid combustion system that utilizes the heat generated by combustion. Five methods of combustion are under consideration for the new project. One is applicable to tar chloride, which can be incinerated with a burner, after which incinerator gases are passed through water to eliminate poisonous gas. Plastics that are difficult to soften under heat can be handled with the fire grid combustion method or the fluid layer method (forcing air through a sand-filled cylinder and making combustion occur by either heating the cylinder or the air). Fireproof material is required in an incinerator in the case of plastic that soften under heat, since these acquire viscocity through heating.

10259 APTIC NO. 28137

Matsumura, Yoshimi

CHEMICAL PROPERTIES OF HEAVY OIL SOOT.

(Juyu nenshobai no kagakuteki seishitsu). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):190, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 10th, 1970.)

Soot in exhaust gas from a heavy-oil boiler was analyzed for acidity, water-soluble components, degree of crystallization of the carbon structure, and free-radical content. Two types of soot that were used: collected by a filter in the stack when B-heavy oil was combusted for a low-pressure sectional boiler, and that collected from the conductor surface of the boiler. Soot from heavy-oil combustion had low levels of carbonization and contained a large amount of water-soluble organic components that were very acidic. In addition, free radicals were contained in the structure of the soot.

10260 APTIC NO. 28139

Mangold, C. A. and R. R. Beckett

COMBINED OCCUPATIONAL EXPOSURE OF SILVER BRAZERS TO CADMIUM OXIDE, NITROGEN DIOXIDE AND FLUORIDES AT A NAVAL SHIPYARD.

Am. Ind. Hyg. Assoc. J., 32(2):115-118, Feb. 1971. 15 refs. (Presented at the American Industrial Hygiene Association, Annual Meeting, Bremerton, Wash., Oct. 2-3, 1969.)

Silver brazers at the Puget Sound Naval Shipyard are chronically exposed to cadmium oxide fume, nitrogen dioxide gas, and fluorides during the assembly of copper, or copper alloy piping aboard ships under construction and repair, and in the pipe shop. Physiological effects of exposures to the toxic gases and fumes produced by silver brazing are cited. While the intermittent peak exposures occurring during the heating cycle often are above the current Threshold Limit Values, the time-weighted average exposure do not exceed the combined threshold limits calculated on the basis of additive effects. The combined occupational exposures to CdO, NO2, and fluorides may occur during an acute exposure, but most likely the effects are due to nitrogen dioxide, since most of the solders in use do not contain cadmium. Since both cadmium oxide fume and nitrogen dioxide gas produce a delayed pulmonary response, acute inhalation cases involving silver brazers might be attributed to cadmium oxide fume, when nitrogen dioxide is the cause. (Author abstract modified)

10261 APTIC NO. 28143

Takei, Kazuo

EFFECTS OF BARIUM COMPOUND ADDITIVE ON DIESEL COMBUSTION.

(Dizeru kikan no nensho ni oyobosu barium kogobutsu seien tenkazai no eikyo). Text in Japanese. Kikai Shikenjo Shoho (J. Mech. Lab.), 24(4):161-170, July 1970. 10 refs.

To ascertain the mechanism by which barium additives reduce the carbon in diesel engine exhaust, samples of diesel soot were examined by electron microscopy and combustion in a test chamber was recorded by a high-speed camera. The soot experiments involved the use of a Mercedes Benz OM312 diesel engine operating on a light oil containing five percent of dispersed BaCO3. The 75PS/2400 rmp related power of the engine was set at 4/4 load, and consistency of exhaust was measured at 4/4 and 1/4 load and 800-2400 rmp. The barium compound was found to reduce the size of carbon particles in soot, particularly at the heavier load. The combustion processe were studied in a cylindrical chamber 39 mm in diameter and 24 mm wide. In addition to photographs taken through a quartz window, the rate of upward pressure and the jet valve lift were measured. With the barium additive, fuel combustion times a/t 4/4 and 4/2 loads were about 10 and 20 degrees longer respectively, in terms of crank angle. Pressure, gas temperature, and percentage and rate of combustion in the later stages of combustion all showed high values. The results demonstrate that barium additives prevent the growth of carbon particles and promote their combustion.

10262 APTIC NO. 28158

Norda, H.

SUPPLYING A POWER PLANT OF THE CHEMICAL INDUSTRY WITH LIQUID AND GASEOUS FUELS.

(Versorgung eines Kraftwerkes der chemischen Industrie mit fluessigen und gasfoermigen Brennstoffen). Text in German. Mitt. Ver Grosskesselbesitzer, 51(1):23-26, Feb. 1971.

A power plant is described which comprises of two boilers with a maximum steam production of 64 tons/hr. The steam exits at 500 C. The boilers are designed for 100% gas operation, 100% oil operation, or for mixed fuels. Each boiler has four oil burners and four gas burners. The stack for the waste gas is 115 m high. Increasingly, chemical-process waste products including carbonic acid, cyan, and gas mixtures from waste-water treatment are burned in the boiler furnaces. Large quantities of hydrogen sulfide gas from a sulfuric acid plant are similarly burned. Further, waste gas which may not reach the atmosphere is burned in the boiler furnaces. Because of the variety of fuels fired in the furnaces, combustion is not always homogeneous. High fluctuations of the heating value occur. These disturbances could be eliminated.

10263 APTIC NO. 28160

Nonnenmann, Manfred

FUTURE DRIVES FOR VEHICLES.

(Zukuenftige Fahrzeugantriebe). Text in German. Oesterr. Ing. Z., 14(1):1-11, Jan. 1971. 19 refs.

Examination of the future trends in power sources for vehicles indicates that Otto, diesel, and Wankel internal combustion engines will continue to dominate. Automatic gears will continue to make headway. The electric motor will be available after 1974 for all vehicles with little need for continuous and long range performance, provided the development of high-energy batteries, primarily the zinc/air battery, is not delayed. Medium-sized trucks will continue to run with diesel engines for a long time to come, while the gas turbine will make headway among large trucks. The Stirling engine and the steam engine are far from ready for mass production.

10264 APTIC NO. 28184

Aalund, Leo

CAT SOLIDS: NEW JOB FOR REFINERS.

Oil Gas J., 69(12):73-75, March 22, 1971.

Texas air pollution regulations currently restrict particulate emissions from catalytic crackers to less than a No. 2 Ringelmann or less than a 40% opacity. To meet this or even more stringent standards, one refinery has adopted a system consisting of modular electrostatic precipitators arranged side by side to act as one collector. The precipitators will handle 410,000 cu ft/min of flue gas from the carbon monoxide boiler at a normal temperature of 630 F and a maximum temperature of 660 F. They will remove 95% of the catalyst from a maximum loading of five tons/day. Using parallel precipitators will make it possible to shut down one side for maintenance without taking the catalytic cracker off line. Opacity observations and use of the Ringelmann scale are mentioned. Advantages and disadvantages of cyclone collectors, electrostatic precipitators, fabric filters, and wet scrubbers are cited.

10265 *APTIC NO. 28194*

Bachmair, A.

MEASURES USED BY BOILER PLANTS TO COMBAT AIR POLLUTION.

(Massnahmen zur Verhinderung von Luftverunreinigung durch Dampfkraftwerke). Text in German. Mitt. Ver. Grosskesselbesitzer, no. 93:446-453, Dec. 1964. 8 refs.

Studies of changes in the emission picture at steam-operated power plants indicate that genuine reductions are being made in the amount of dust emitted, while at the same time the output of steam and the production of power continues to grow. Although the quantity of sulfur dioxide emissions has increased, the danger to the immediate environment has been reduced considerably, due to the construction of higher smokestacks. A qualitative and quantitative description is given of boiler-plant emissions, including coarse and fine dust and SO2. A map indicates the areas where industrial emissions are critical, which include West Berlin, Hamburg, Bremen, Hannover, the Ruhr, Cologne, the Frankfort complex, Saarbruecken, Manheim, Stuttgart, and Munich. A graph shows the relationship between specific dust emission, ash content of fuel, degree of retention, and extent of dust separation. Antipollution efforts are discussed against the background of a new 'technical guide' issued by the government. The power industry has not completely satisfied all the government regulations of recent times, but the author suggests that this reflects deficiencies in the present state of knowledge and technique, which continues to impose limitations on further progress.

10266 APTIC NO. 28197

Tesner, P. A.

FORMATION OF SOOT DURING DECOMPOSITION AND COMBUSTION OF HYDROCARBONS.

(Obrazovaniye sazhi pri razlozhenii i gorenii uglevodorodov). Text in Russian. Gaz. Prom., no. 5:46-53, 1961.

The formation of soot nuclei, particle growth, particle aggregation, thermal decomposition, diffusion laminar combustion turbulent diffusion combustion, and combustion of pre-mixed gases are discussed. Soviet literature up to 1960 is cited. Understanding of the process of soot formation during the decomposition and combustion of hydrocarbons is considered to be inadequate, and further study of free turbulent combustion as well as the mechanism of soot nuclei formation is urged.

10267 APTIC NO. 28210

Bolotov, M. P.

CERTAIN SOURCES OF LEAD IN SOIL AND STREET DUST OF CITIES.

(O nekotorykh istochnikakh svintsa v pochve i v ulichnoy pyli gorodov). Text in Russian. Gigiena i Sanit., no. 1:49-50, 1940. 3 refs.

Lead content was determined for dust samples taken from various surfaces in the cities of Kranodar, Moscow, and Leningrad. Highest lead content was found in samples taken from rubber footwear (2368 mg/100 g), and in paint and scrapings from zinc plated roofing (1860 mg/100 g). It is concluded that corrosion, abrasion, and atomization of lead-bearing materials constitutes an important pollution source.

10268 APTIC NO. 28211

FRENCH METHANE TANKER 'JULES VERNE'.

Marine Engr. Naval Architect, 87(1063):458-461, Oct. 1964.

A technical description of the construction of the French methane tanker 'Jules Verne' is given. Special considerations due to the unique method of manufacture and placement of the storage tanks are included. The load-carrying structural members of the ship are identified, and the testing and inspection program is described Insulation of the cryogenic cargo fulfills two essential functions; it limits the loss of gas by evaporation, and it protects the hull against excessive cooling. In addition, the bottom insulation must be load-bearing. Cargo-handling facilities are described, and an account of a return voyage with empty tanks is included.

10269 APTIC NO. 28235

LIQUEFACTION OF METHANE.

Mech. Eng., vol. 87:70-71, Nov. 1965. 1 ref.

Power requirements for three methane liquefaction processes are compared graphically. One system uses only a single compressor to compress methane to a predetermined temperature and calls for lower pressures. In this system, the compressed gas is first expanded in a turbine and then in a heat exchanger. The other systems both use medium-pressure and high-pressure compression, the difference between them being that one employs a single turbine and a single heat exchanger and the other, two turbines and two heat exhangers. It is noted that advantages in respect to power consumption which are gained by increased pressures are cancelled out by the increased costs of compressors and cooling units.

10270 APTIC NO. 28264

REPORT ON LECTURE GROUP 'A' OF THE CONGRESS 'REINHALTUNG DER LUFT 1969' (SUMMARY).

Staub (English translation from German of: Staub Reinhaltung Luft), 30(2):4-5, Feb. 1970.

Summaries are presented of lectures on measures taken in West Germany to reduce motor vehicle exhaust emissions, on the technical possibilities of reducing exhaust components, on the state of development new engines, and on emissions from vehicles operating on liquefied gas. In 1968, West Germany issued three specific regulations connected with motor-vehicle licensing procedures: they deal with idling, crankcase ventilation, and engine behavior under various operating conditions. Carbon monoxide, hydrocarbons, and partly oxidized hydrocarbons in conventional engine exhaust can be reduced to harmless amounts. Difficulties exist with regard to reduction of nitrogen oxides. Tests indicate that liquefied gas permits a considerable reduction of carbon monoxide and nitrogen oxides emission, but not reduction of hydrocarbon emission.

10271 APTIC NO. 28268

Clark, W. E. and F. Kurata

FREEZING CO2 FROM NATURAL GAS.

Petrol. Refiner, 38(6):249-251, June 1959. 6 refs.

The conditions under which carbon dioxide can be removed from natural gas by freezing in a simple solids-gas separator are examined. The temperature and pressure in the solids-gas separator are set by the natural gas purity desired. Based on feed gas compositions of 30, 30, 10, and 5 mole% CO2, production of 100,000,000 SCFD natural gas containing 98 mole% methane and 2% CO2 would require -168 F and 250 psia. The greater the amount of CO2 in the field gas, the lower the temperature must be to freeze out the CO2. This places a limit of 30 mole% on the amount of CO2 that can be handled by the system. For CO2 content above 30 mole%, the refrigeration load becomes great and the product gas must be recycled. For field gas of low CO2 content, both the solid CO2 and the product gas could be used in a heat exchanger to cool the feed stream, eleiminating the need for refrigeration.

10272 APTIC NO. 28281

Laverty, F. W. and W. C. Edmister

LIQUEFACTION AND REGASIFICATION OF LIGHTER HYDROCARBONS.

Oil Gas J., 40(17):35, 38-39, 53, 55-56, 58, Sept. 4, 1941. 1 ref.

The lighter hydrocarbons constituting natural gas are methane, ethane, propane, isobutane, and normal butane, plus, in the case of refinery gas, ethylene and propylene. An accurate knowledge of the thermodynamic properties of these hydrocarbons and their mixtures is required for the design of natural gas liquefaction and regasification equipment. Essential data include vapor pressures, boiling points, dew points, critical points, entropies, and enthalpies. The latter two can be prepared in graphical form such as the Mollier diagram, examples of which are presented for methane, propane, propylene, and three mixtures. The large amount of data available from the charts is noted and illustrated by calculations for a standard refrigeration cycle using propane. Features of a natural gas liquefaction plant in Cleveland are also described. The plant uses ammonia and ethylene as the refrigerants in a cascade cycle and is able to store 150,000,000 cu ft of liquefied gas.

10273 APTIC NO. 28282

Schuursma, M. J. N.

FLUORINE POISONING RESULTING FROM THE AIR POLLUTION CREATED BY A SUPERPHOSPHATE PLANT.

(Fluoorvergiftiging tengevolge van luchtverontreiniging door een superphosphaatfabriek). Text in Dutch. Chem. Weekblad, 38:583-584, 1941. 4 refs.

A complaint made to the public health agency that window panes in buildings located near a superphosphate plant were strongly etched indicated the presence of hydrogen fluoride in the atmosphere, which was traceable to the high content (3%) of fluorine compounds in the raw phosphate used at the plant. For a number of years there had been technical knowledge of wet processes by which the HF gas could be recovered and used in the manufacture of sodium fluorosilicate, a highly marketable byproduct. It was found that while the phosphate used as raw material contained 3% fluorine, the superphosphate product contained only 1%. Two rainwater sampling stations were set up, on 100 m from the plant, the other 300 m, and the chemical composition of the samples from these two locations were compared with that of a study made elsewhere. This comparison revealed a relatively high concentration of chloride, nitrate, calcium, and phosphate ions, as well as a 2.0% content of fluoride ions at the 100 m station, and 1.3% at 300 m. The study further demonstrated that milk poisoning, traceable to dairy animals who were pastured in the vicinity of the plant, could be derived from this excessive concentration of fluorine in the atmosphere. Earlier complaints of milk poisoning had been attributed to pollution from sulfur dioxide and nitrogen compounds, and to a fine dust that was emitted from the plant.

10274 APTIC NO. 28295

Sugiura, Kimiaki

ODOR POLLUTION.

(Midori kagaku no akushu 'Kogai' ni tsuite). Text in Japanese. Preprint, Inst. for Disaster Prevention (Japan), p. 40-41, 1971. (Presented at the Disaster Prevention Chemistry Meeting, 11th, Japan, Jan. 22-23, 1971.)

An investigation made at the request of a hospital identified certain aldehydes and aromatics as the source of objectionable odors issuing from a neighboring pharmaceutical plant. Subsequently, questionnaires were sent to 993 households within a 300-m radius of the plant. Of the 591 households responding, 12% reported the continuous presence of odors, 24.2% the intermittent presence, and 19.5% the occasional presence. An additional 1.4% noted the past occurrence of odors. Following this survey, the prefectural government tested the plant effluent on three occasions and ultimately recommended effluent treatment facilities. The value of the survey is noted to be that it established a relationship between the odor and citizens' complaints, thus entitling the citizens to the right of odor abatement. The plant is now installing an odor control device on its vacuum rotating dryer.

10275 APTIC NO. 28310

Chalyy, L. G. and V. I. Trush

INVESTIGATION OF THE PHYSICO-CHEMICAL PROPERTIES OF DUST IN GAS DISCHARGES OF CONVERTERS AND OPEN-HEARTH FURNACES OPERATING WITH THE USE OF OXYGEN.

(Issledovaniye fizikho-khimicheskikh svoystv pyli v vybrosakh konverterov i martenovskikh pechey, rabotayushchikh s primeneniyem kisloroda). Text in Russian. Stal, 30(10):953, Oct. 1970.

Oxygen blow-through of open-hearth furnaces at 8-10 cu m/ton-hr, and in a 50-ton converter at 3-6 cu m/ton-min produces sublimed particles of iron oxides up to 1 micron in size, and mechanically entrained particles of sand, metal and slag measuring 100-250 micron and larger. Electron diffraction data show that 90-93% of the dust leaving the waste-heat boiler consists of 0.01-1.0 micron particles, with half of these, by weight, less than 0.3-0.4 micron in diameter. Specific electrical resistance of these dusts ranges 10-10,000 megohm-cm at 20-300 C (dew point 18-60 C).

10276 APTIC NO. 28311

Chalyy, L. G.

PHYSICO-CHEMICAL PROPERTIES OF DUST IN WASTE GASES DURING FIRING OF REFRACTORY RAW MATERIALS IN ROTARY KILNS.

(Fiziko- khimicheskiye svoystva pyli v otkhodyashchikh gazakh pri obzhige ogneupornogo syr'ya vo vrashchayushchikhsya pechakh). Text in Russian. Stal, 30(10):931, Oct. 1970.

Investigations at 20 rotary-kiln installations revealed the electrical resistance of chamotte and dolomitic dusts in the exhaust ranges from 100,000 to 1,000,000 megohm-cm, while mean particle size varies from 50 to 70 micron in front of the cyclone separators, and 30-40 micron in front of the electrostatic precipitator. Chamotte dust consisted of 50-60% silica plus alumina; dolomite dust contained 40-50% potassium oxide plus magnesium.

10277 APTIC NO. 28324

Schwarzbauer, Gerd and Dusan Gruden

COMBUSTION CHAMBER TEMPERATURE AND HEAT LIBERATION IN THE COMBUSTION ENGINE.

(Brennraumtemperatur und Waermefreisetzung im Verbrennungsmotor). Text in German. Motortech. Z. (Stuttgart), 32(2):61-64, 1971. 15 refs.

Mean combustion temperatures in combustion engines were determined directly from the pV and p alpha diagrams using the state equation for gases. A linear change of the mol number with the crank angle was assumed. The mean temperatures were used to calculate the heat liberated and to determine the fractions of uncombusted and combusted material. With a knowledge of the temperature characteristics of uncombusted and combusted material, nitric oxide of formation in the clyinder can be calcuated more accurately than with any measuring unit.

10278 APTIC NO. 28336

Kleinert, Reinhard

GENERAL AND SPECIAL MARKETING QUESTIONS OF THE METAL LEAD.

(Allgemeine und spezielle Marktfragen des Metalls Blei). Text in German. Z. Erzbergbau Metallhuettenwesen, 24(1):18-25, 1971. (Presented at the Gesellschaft Deutscher Metalhuetten- und Bergleute Meeting, Berlin, May 28, 1970.)

Lead is used to manufacture storage batteries, cable sleeves, dyes and as an antiknock agent and for soldering metal. The use of tetraethyl lead is widely debated, some groups demanding a total prohibition. The outcome of this controversy cannot be predicted. The chairman of Ethyl Corp., USA, is resisting all efforts to introduce lead-free gasoline, which will cost the consumer much more. It is not positively known whether lead contributes to air pollution; lead-free gasoline with a high octane content is dangerous to human health. It is assumed that some content is dangerous to human health. It is assumed that some limitation in the use of tetraethyl lead will be introduced in all industrialized countries sooner or later. In Great Britain, consumption of tetraethyl lead rose rapidly between 1967 and 1968, while a regressive tendency was observed between 1968 and 1969. On the average, the world's lead consumption will rise between 2.5 and 3.5% before 1980.

10279 APTIC NO. 28340

Klein, H. -J. and M. Kunze

EXPERIMENTAL INVESTIGATIONS ON THE SPREAD OF PSEUDOMONAS AERUGINOSA BY A COLD AEROSOL APPARATUS FOR MOISTENING THE ROOM ATMOSPHERE.

(Experimentelle Untersuchungen ueber die Verbreitung von Pseud. aeruginosa durch ein Kaltvernebelungsgeraet zur Raumluftbefeuchtung). Text in German. Zbl. Bakt., 216(2):199-209, 1971. 21 refs.

The extent and regularity of the spread of Pseudomonas aeruginosa by aerosols from a cold-water humidifier were determined. The apparatus sprayed 1,000,000 germs/ml for 1 min, 10,000 germs/mi for 10 min, and 1000 germs/ml for 1 hr. The spread of germs within the the experimental room was investigated by means of sedimentation, 'plate tree', and impression methods. A germ number of 1,000,000/ml in the water tank of the humidifier caused, after one minute of operation, a massive spread of Pseudomonas aeruginosa within the experimental room. The sprayed germs sedimented within 10 minutes. On an area of only 63 cm (surface of sedimentation plate) 484 germs were counted. The contamination was even greater when 10,000 germs/ml were sprayed for 60 minutes. The longer the spraying, the longer the duration of the pollution. The consequences of these findings for hospital hygiene are discussed.

10280 APTIC NO. 28342

Zacharias, Friedemann

A STUDY OF THE EXTERNAL COMBUSTION SYSTEM OF THE STIRLING HOT GAS ENGINE.

(Betrachtungen zum aeusseren Verbrennungssystem des Stirling-Heissgasmotors). Text in German. Motortech. Z. (Stuttgart), 32(1):1-5, Jan. 1971. 7 refs.

The Stirling engine is a piston engine with an external combustion process and a closed internal gas circulation process. Through external heat production, uniform, continuous combustion is feasible. The noise level is much lower than that of internal combustion engines. The uniform flame permits clean combustion. The heat produced by external combustion is transported by a blower to the combustion chamber. After combustion, the hot combustion gases leave their heat energy in the heat exchanger for operation of the engine. In the Stirling engine energy conversion losses occur which can be expressed by multiplying the efficiencies of secondary processes. The external combustion system is an autonomous system which must be started separately to warm up all heat exchangers so that sufficient heat is available when the Stirling engine itself is started. The entire starting process lasts less than one minute. Three versions of the Stirling motor are briefly described. The first version, with a mechanically operated burner ventilator and single-stage combustion was used for the pilot engines. Version two has a mechanically operated blower and two or more combustion stages. Version three has a turbocharger as a blower with single-stage combustion.

10281 APTIC NO. 28347

Yamada, Takeshi

INCINERATION TECHNIQUE FOR REFUSES OF SYNTHETIC HIGH POLYMER SUBSTANCE.

(Gosei kobunshi kaikibutsu no nensho-gijutsu). Text in Japanese. Kogai (Hakua Shobo) (Pollution Control), 5(6):292-300, Nov. 1970. 5 refs.

The incineration of high-polymer plastics was discussed, including combustion characteristics of the high-polymer materials, substances formed as a result of their combustion, and methods and devices for incinerating them for disposal. Except for those that generate hydrogen chloride or hydrogen fluoride, plastic refuse have a low ash content and a high caloric value. Therefore, it is considered a high-quality fuel, so that heat generated by its combustion should be effectively utilized. An incinerator for high-polymer wastes should be designed so as to ensure perfect combustion without generating soot and noxious gases, have low construction costs and running expenses and permit stable operation for a sustained period. The combustion characteristics, caloric value, cracking temperature firing temperature, heat conductivity, and specific heat are shown for polyethylene, polypropylene, polyvinyl chloride, polystyrene, phenol, melamine, urea resin, and polyurethane. The composition of substances formed during combustion of plastics can be determined through thermal weight analysis, differential thermal analysis, gas chromatography, and mass spectrometry. Substances formed during combustion of vinyl chloride are tabulated. Various incineration methods were introduced, each with an illustration of its basic mechanism. Methods include hearth combustion for plastics that melt easily, fire grate combustion for those which are hard to melt, filled-layer combustion, in which plastic refuse is burned on the surface of a layer of fireproof crushed material formed on the bottom of the combustion chamber, rotary-furnace type combustion, helical air current combustion, atomization combustion, and granulation combustion.

10282 APTIC NO. 28352

Ainsley, Yvon

POLLUTION CAUSED BY AUTOMOTIVE VEHICLES.

(Pollution causee par les vehicules-automobiles). Text in French. Ingenieur, 57e(263): 11-14, Feb. 1971. 5 refs.

Acceleration of a vehicle contributes a higher percentage of carbon monoxide (83%) and of nitrogen oxides (89.3%), while deceleration contributes the highest amount of unburned hydrocarbons. (50.2%). A vehicle not equipped with an antipollution device gives off about 0.64 tons per year of carbon monoxide when driven 7000 miles. Pollution due to unburned hydrocarbons comes from 3 sources. Hydrocarbons passing through the combustion chamber and into the exhaust account for 60%, while blow-by gas accounts for about 20%, and another 20% escapes by evaporation from the gas tank and carburetor. This can add up to a total of 1500 ppm of emissions, or 0.12 tons annually, with a mileage of 7000 miles, when the vehicle is not equipped with an antipollution device. The annual emission of nitrogen oxides amounts to about 0.047 tons. Automobile manufacturers are making available, to the owners of older cars, a device, costing about $50, which reduces carbon monoxide and hydrocarbon emissions by about 40%. It has been shown by tests in the United States that hydrocarbons can be reduced by 10% and carbon monoxide by 16% by a proper adjustment of the carburetor. Automobile dealers must be equipped with devices for reading the emissions of CO and hydrocarbons with instruments, so that it will no longer be necessary to make carburetor adjustments by the 'sound' of the motor. A device for diesel vehicles, to be made available in 1971, would permit reduction of undesirable odors in the diesel exhaust. The use of diesel automobiles should be recommended, especially by vehicles, such as taxis, that are used entirely in town. The development of vehicles that burn natural gas and propane would also reduce pollution levels. The planning of roads is also an important factor in pollution. Road beds that are below the level of the ground, or highways flanked by tall buildings on both sides hinder the dispersion of pollutants, increasing their danger.

10283 APTIC NO. 28371

Masek, Vaclav

THE COMPOSITION OF DUSTS ON WORK SITES AND IN THE CLOSE VICINITY OF IRON WORKS.

(Ueber die Zusammensetzung der Staeube an den Arbeitsplaetzen und in der nahen Umgebung von Eisenhuettenwerken). Text in German. Staub, Reinhaltung Luft, 31(2):66-68, Feb. 1971. 15 refs.

The grain size distribution, specific surface area, soot content, 3,4-benzopyrene content, arsenic content, and chemical and roentgenographic composition of dusts collected at work sites and in the vicinity of blast furnaces, steel works, rolling mills, and foundries of the industrial area of Ostrava in Czechoslovakia were determined. The dust contained around 30% silicon dioxide, 7% calcium oxide, 3% magnesium oxide, 15% aluminum trioxide, 15-50% ferric oxide, and 0.25% manganese. The share of the dust of a grain size below 1 micron fluctuated between 3 and 24% and above 4 micron, between 5 and 32%. The specific surface of the dust fluctuated between 1.2 and 14.1 sq m/g; the soot content, between 7 and 64%; the 3,4-benzopyrene content, between 0.1 and 13%; and the arsenic content, between 0.02 and 1.18%. Most of this dust falls on cultivated land.

10284 APTIC NO. 28385

Yuill, C. H., A. J. Bartosic, G. T. Castino, H. W. Eickner, J. R. Gaskill, N. S. Pearce, A. F. Robertson, and Z. Zabawsky

THE CONTROL OF SMOKE IN BUILDING FIRES--A STATE-OF-THE-ART REVIEW.

Mater. Res. Std., 11(4):16-23, April 1971. 42 refs.

ASTM Committee E-5 on Fire Tests of Materials and Construction has been increasingly concerned with the life hazard of smoke and noxious gases generated during fires in buildings. A task group within Subcommittee IV on Fire Tests of Acoustical and Similar Finishers has reviewed the situation with respect to smoke and has found that the exact nature of the hazard has not been well defined. As a result, efforts to control the use of materials alleged to produce objectionable amounts of smoke when exposed to fire situations lack a desirable degree of uniformity. The nature of smoke, its development in building fires, efforts toward control through regulation and building design, existing and proposed test methods for smoke measurement, and test criteria are discussed in this paper. (Author abstract)

10285 APTIC NO. 28388

Baum, F., W. Brocke, and W. Block

DEVELOPMENT OF MEASUREMENT METHODS AND EMISSION MEASUREMENTS ON BOILER PLANTS FOR SOLID FUEL WITH NOMINAL CAPACITIES BETWEEN 18,000 AND 800,000 KCAL/HR.

(Entwicklung von Messmethoden und Emissions messungen an Kesselanlagen fuer feste Brennstoffe mit Nennleistungen zwishen 18,000 kcal/hr. Text in German. Gesundh. Ingr., 92(1):12-20, Jan. 1971. 18 refs.

Measurements were made of dust emissions from 69 solid-fuel, central-heating boilers which had nominal capacities between 18,000 and 800,000 kcal/hr with the exception of six having nominal capacities of 18,500 and 20,000 kcal/hr. The measuring unit consisted of a sampling probe, a filter holding mechanism, a connection hose, and suction pump. The air sample (90 l) was drawn into the probe through an opening 9.72 mm diameter, and the dust carried by the air sample was deposited in a thimble filter. Sampling speed was 4m/sec, referred to a waste gas temperature of 320 C, and a barometric pressure of 753 mm mercury. A piston membrane pump with four entrance and four exit valves was used for drawing in the air samples. The motor of the pump switched off automatically after 10 min to maintain a constant volume intake. Boilers where the entire fuel bed burns were found emitted less dust than systems where only the bottom layer burns. The latter type emits less volatile matter, however.

10286 APTIC NO. 28391

THE CITY'S $15M INCINERATOR.

Water Pollution Control (Toronto), 109(3):46-49, March 1971. 37 refs.

Pollution originating from incinerators is the fifth largest contribution to air pollution according to Federal Government figures on the weight percentage of total emissions from various sources. In the early spring of 1962, an extensive survey was carried out in Montreal concerning domestic incinerators, and instruction sheets were distributed to landlords and tenants. An ordinance was adopted in 1967 requiring all incinerators to have three chambers, to be furnished with a burner automatically maintained at 1400 F, and an air cleaner that would retain 90% of the solids in gas emissions. Of the 5000 manual labor employees of the City of Montreal, there are about 50 to 60 who work at refuse collection and disposal. The City uses 193 garbage trucks each with a capacity of 20 cubic yards or five tons. These trucks belong to 33 contractors, some of whom have only one truck, and it costs about $.30 per ton per mile to pick up refuse. The garbage is burnt at the municipal incinerators, releasing about 4800 British Thermal Units per pound of garbage. Industries must pay $4.00 per ton for the garbage they send to be burnt at a municipal incinerator. Various Montreal municipal incinerators since 1931, their capacities, and operating variables are mentioned.

10287 APTIC NO. 28394

Dabelstein, Werner

THE PROBLEM OF LEADING GASOLINE.

(Zur Problematik der Benzinverbleiung). Text in German. Erdoel Kohle (Hamburg), 24(1):37-40, Jan. 1971. 16 refs. (Presented at the DGMK Bezirksgruppe Hamburg - Bremen, Hamburg, West Germany, Nov. 24, 1970.)

Lead alkyls, primarily tetraethyl lead and more recently tetramethy lead, have been used for more than 40 years as antiknock additives for gasolines for Otto engines to increase the octane number of the gasoline. Straight-run gasolines have octane numbers between 30 and 70 while Otto fuels containing lead have octane numbers of 100 (super) and 93 (normal). Removing lead from gasolines while maintaining the octane number would cost refineries four billion dollars. This would mean an increase in the price of gasoline 2-5 cents/gallon. Extensive experiments and observations have shown that there are no substitute additives for lead alkyls. Lead-free gasolines would not satisfy engines designed for super gasolines. Cars which run with normal gasoline would have to switch to lead free super gasoline and no market would be left for lead-free normal gasoline. The major efforts, therefore, concentrate on reducing the lead content rather than eliminating it entirely. As studies have shown, the effects of leaded gasolines on humans are not as harmful, as once thought. Lead intake from food and drink is ten times as high as by inhalation. Ninety percent of the lead intake (including inhaled lead) is discharged directly, only 10% entering the blood stream.

10288 APTIC NO. 28396

Siebert, Max

THE MOBIL OIL REFINERY AT WOERTH.

(Die Mobil Raffinerie Woerth). Text in German. Erdoel Kohle (Hamburg), 24(1):27-31, Jan. 1971.

The Mobil oil refinery at Woerth burns all its waste gases in a 67 m flare, to which security valves and relief pipes are connected. All flue gas producing plants are arranged around the 150 m high stack. Sulfur dioxide concentration and smoke shade are continuously determined. The sulfur containing gases (refinery gas and liquid petroleum gas) are liberated from hydrogen sulfide in diethylamine scrubbers prior to their use for firing in the refinery. Even with the firing of heavy fuel oil, a 50% safety factor is included by the stack height of 150 m. During inversion conditions, it is possible to switch within a short time to the use of a low sulfur fuel with less than 0.5% sulfur.

10289 APTIC NO. 28407

Heschel, Wolfgang and Manfred Born

THE PROBLEM OF DUST EMISSION FROM MATERIALS UNDERGOING THERMAL TREATMENT.

(Beitrag zum Problem des Staubauswurfes aus thermisch beanspruchten Schuettungen). Text in German. Freiberger Forschungsh. A, vol. 477:57-79, 1970. 8 refs.

The influence of thermal pretreatment of materials being gasified (like brown coal briquettes) on dust content in the generated gas was investigated by comparative tests with a countercurrent solid-bed shaft generator under normal pressure and an 800 mm deep bed. The factors affecting dust emission include the mechanical strength of the material, the type of fuel, its chemical composition, depth of bed, charging frequency, and blast velocity. The experimental materials tested included fine grain briquettes F4, briquettes dried at 150 C, coke produced at 400 C, at 600 C, at 800 and at 1000 C. The tendency of a material to form dust directly affected dust emission during gasification. Another factor affecting dust emission are gas transport conditions. The gasification zone was the source of dust emission and the filtering effect of the loose material layer situated over the dust generating zone exerted a decisive influence on dust discharge. Least dust was generated by briquettes predried at moderate temperatures, mostly by coke beds.

10290 APTIC NO. 28416

Starkman, E. S.

SOME BASIC CONSIDERATIONS IN FORMATION OF COMBUSTION ENGINE EXHAUST PRODUCTS.

Preprint, 17p., 1970. 11 refs. (Presented at the Internal Combustion Engines Conference, 2nd International, Bucharest (Rumania), 1970, Paper II.d.)

Data are reported for the concentration of nitrogen oxides as extracted from the cylinder of a single cylcinder engine into two sampling positions. Operating conditions were: compression ratio, 6.37:1; engine speed, 1275 rpm; fuel/air equivalence ratio, 1.01; and spark advance, 49 deg before top center. The nitrogen oxides concentration at the peripheral sampling port was a maximum of about 4500 ppm (0.45%); at the top port it was about 3000 ppm (0.3%). Exhaust measurements were about 4000 ppm (0.4%). The magnitude of the measured concentration gradient is discussed in terms of the effects of temperature gradient in the burned gases, combustion chamber shape, and spark plug location. As theoretically determined, engine design for minimum nitrogen oxide emission should avoid a spark plug located centrally in the combustion chamber.

10291 APTIC NO. 28424

Coltman, R. W.

GASES FROM CARBON ARCS.

J. Ind. Hyg. Toxicol., 20(4):289-296, April 1938. 6 refs.

Carbon arcs can be divided into three broad classes: plain or low intensity arcs, flame arcs, and high-intensity arcs. The construction and composition of the cores of the carbon electrodes (i.e., 'carbons'), together with the power used, determine the particular type of arc that will be obtained. In the present investigation, the combustion products of various carbons were analyzed for their quantities of carbon monoxide and nitrogen compounds. All carbons except the high-intensity type were burned in a vertical feed lamp through which air was passed at 5 cfm. The results with this lamp are typical of those obtained with plain, white, flame, therapeutic, or low-intensity carbons. High-intensity carbons were burned in a high-intensity lamp with a draft or 40 cfm. The results show that with any one type of carbon, the amount of nitrogen fixation is approximately proportional to the arc current and that unimpregnated and therapeutic 'C' carbons give much higher quantities of fixed nitrogen than carbons containing rare earths. Depending on type of carbon and power consumption, nitric oxide concentrations ranged from 200-1500 ppm. These values show the need for dilution of nitrogen oxides to values below those unusually considered dangerous and the necessity for adequate ventilation. Even in the most extreme cases, the amount of carbon monoxide formed was negligible from a health standpoint.

10292 APTIC NO. 28426

Hody, George L. and Robert W. Bailey

WEAPONS EXHAUST CONTAMINANTS INSIDE HELICOPTERS.

Aerospace Med., vol. 39:641-644, June 1968. 7 refs.

The problem of toxic contamination of helicopters used as weapons platforms was investigated in laboratory tests in which carbon monoxide was employed as a chemical tracer for other materials in weapons exhaust. A list of 26 compounds identified is shown together with the appropriate measurement instrument. Also shown is the ratio of the concentration of nine of the most significant components to carbon monoxide concentrations. The maximum carbon monoxide value measured in a UH-1 helicopter after four simulated missions was 100 ppm, which is the NASA threshold limit. In the rear of a CH-47B, a high as 1000 ppm carbon monoxide was measured during a short exposure time.

10293 APTIC NO. 28430

Zmuda, Joseph

THE STEAM CAR: CAN IT HELP US? Calif. Health, 27(9):1-4, March 1970.

A resurgence of interest in the steam-powered automobile as a solution to the problem of automotive emissions occurred in the 1967-69 period, but declined when no practical steam system that could go into immediate production was demonstrated, despite the numerous advantages claimed for steam cars clean air, reduced noise, increased fuel economy, simpler, smaller, and lighte total system, and consumer savings and the numerous modern test vehicles that have been constructed. Engineering problems include increased power needs to compete fully with the gasoline engine, expander (engine) design complexities, development of an adequate condenser, and suitable operating fluids other than water. Emissions performance to date has been disappointing, contrary to theoretical predictions; heavy soot accumulations in burners and flues of traditional steam cars suggest incomplete combustion of hydrocarbons, and emissions data on modern versions are either inconclusive or have not been made public. It appears that goals were set too high to be achieved with the limited time and funds allotted and the small number of competent thermodynamicists available to work on the problem.

10294 APTIC NO. 28432

Stannard, James H., Jr.

STORAGE METHODS FOR LIQUEFIED NATURAL GAS.

Proc. Pacific Coast Gas Assoc., vol. 57:79-83, 1966. 13 refs.

The size and design of the storage vessel which is used in a liquefied natural gas project will have considerable impact upon the balance of the project. Not only will the efficiency of the vessel as a cryogenic container establish many sizing parameters in the liquefaction equipment, it will also establish the level of many long-term operating costs. It is not uncommon for the storage vessel to represent 30 to 50% of the plant investment, while the performance of the vessel may even establish the ultimate composition and usability of the stored liquid product. Two basic vessel designs include the double walled above ground metallic tank and the frozen earth or 'Cryogenic Inground' storage vessel. In addition to LNG, the metallic vessel has been used to store ammonia, propane, oxygen, nitrogen, and hydrogen. Construction technique is to build a flat bottomed tank of a material (such as aluminum or 9% nickel steel) which is suitable for the low temperature service. This tank is normally built upon a pad of light-weight concrete for support and thermal insulation. Another vessel is constructed around this tank normally using a low carbon steel, and the annular space between the two vessels is filled with a loose insulating material such as perlite. The atmosphere in the annular space is purged with dry nitrogen to prevent water condensation in the insulating material. Basically the construction technique for the frozen earth vessel is to sink a series of vertical freeze pipes around the periphery of the proposed vessel. Refrigerant is then circulated through the freeze pipes until a ring or cofferdam of frozen earth is formed. The unfrozen earth is then excavated from the center of the vessel, and a roof is installed over the cavity. A brief description of several major vessel designs is given, including the impact of heat leak or boil-off. Reliquefaction is also mentioned.

10295 APTIC NO. 28470

Sanner, W. S., C. Ortuglio, J. G. Walters, and D. E. Wolfson

CONVERSION OF MUNICIPAL AND INDUSTRIAL REFUSE INTO USEFUL MATERIALS BY PYROLYSIS.

Bureau of Mines, Washington, D. C., Rept. of Investigations, no. 7428, 14p., Aug. 1970. 4 refs.

NTIS: PB 194946

Pyrolysis techniques similar to those applied in destructive distillation of coal can be used to convert household and industrial refuse into potentially useful solids, liquids, and gases without contributing to environmental pollution. A ton of municipal refuse, pyrolyzed at 900 C, can be converted to 154 pounds of solid residue, 0.5 gallon of tar, 114 gallons of liquor, 25 pounds of ammonium sulfate, and 17,741 cubic feet of gas. A ton of municipal refuse containing mainly plastics can be converted to 382 pounds of solid residue, 1.5 gallons of tar, 0.5 gallon of light oil, 97.4 gallons of liquor, 31.5 pounds of ammonium sulfate, and 18,058 cubic feet of gas. A ton of industrial refuse consisting mainly of paper, rags, and cardboard, pyrolyzed at 900 C, can be converted to 618 pounds of solid residue, small amounts of tar, 1.4 gallons of light oil, 68.5 gallons of liquor, 22.9 pounds of ammonium sulfate, and 14,065 cubic feet of gas. The solid residue, a lightweight, flaky, carbonaceous material, represents a 90-percent weight reduction for the municipal refuse and a 65-percent reduction for industrial refuse. The residue from municipal refuse has the highest fuel value and can range from 10 to 17 million Btu per ton. As much as 53 percent of the raw product gas is carbon monoxide, methane, and ethylene, and the volume of gas produced is ample to provide the energy for pyrolysis of the refuse. The high hydrogen content of the gas may also have promise as a source of hydrogen or methane. The tar from the pyrolysis of refuse will provide an additional 736,000 Btu per ton of refuse, and the light oil produced is a potential source of benzene and toluene. The results of these experiments strongly suggest that the pilot plant should be modified and expanded to provide for continuous operation so that reliable data can be obtained for projecting costs of large-scale pyrolysis plants. The effect that drying the raw refuse before pyrolysis would have on the yield and the quality of products should also be studied. (Author summary)

10296 APTIC NO. 28472

Nelson, Kenneth W.

CLEAN AIR.

Missouri Univ., Rolla, Proc. Mining Environ. Conf., Rolla, Mo., 1969, p. 188-203. (April 16-18.)

Emotion and politics have provided much of the impetus for air quality control programs, fostering distortions of fact, unfounded condemnations of industry, and in general an adversary system of government against industry. Some scientists use their prestigious positions as platforms from which to expound publicly their unproven speculations about air pollution. Some pollution is inevitable in our cities, and definitions are important and extremely difficult when considering 'injury' or 'hazard' in relation to such effects as haze, odors, and momentary irritations. Esthetic effects are sometimes emphasized even more than nuisance or possible health effects, with no consideration of costs or other pressing problems. Government figures indicate that industry's estimated contribution to air pollution is considerably less than one might expect, in contrast to automotive sources. Figures also indicate that although there are slight variations, there is no distinct worsening of concentrations of pollutants; conversion to natural gas or electric heat may in part be counteracting increasing numbers of automobiles. In addition, natural removal mechanisms in the atmosphere and biosphere act to keep concentrations down. A fair statement on the basis of the numerous studies of health effects of air pollution would be to say that air pollution in our cities today probably does not cause disease but that it may aggravate existing disease. Air pollution is not an immediate or near-term threat to our existence.

10297 APTIC NO. 28487

Niedzwiecki, Richard W., Albert J. Juhasz, and David N. Anderson

PERFORMANCE OF A SWIRL-CAN PRIMARY COMBUSTOR TO OUTLET TEMPERATURES OF 3600 F (2256 K).

Lewis Research Center, Cleveland, Ohio, TM X-52902, 11p., Sept. 1970. 8 refs.

NTIS: N70-40624

Efforts were made to operate a full-annulus swirl-can primary combustor at outlet temperatures within a few hundred degrees of th stoichiometric temperature. Such a combustor may find application in future military aircraft wherein a minimum size, minimum weight turbine engine would be used for take-off and acceleration to high cruise Mach numbers and a ram jet engine would be used for propulsion during cruise. Combustion efficiency, the pattern factor, smoke emission, and pressure lost were all quite favorable. However, additional work will be required before good durability and reliability are obtained. (Author summary modified)

10298 APTIC NO. 28490

Zdrazil, J. and F. Picha

THE OCCURRENCE OF 3,4-BENZPYRENE IN THE ATMOSPHERE AT THE MANUFACTURE OF CAST METAL MOUNTINGS.

(Vyskyt 3,4-benzpyrenu v ovzdusi ve vyrobe litinovych armatur). Text in Czech. Pracovni Lekar. (Prague), 15(9):384-387, Nov. 1963. 2 refs.

Attention is called to the risk of carcinogenic 3,4-benzpyrene in the manufacture of cast-iron mountings protected against corrosion by a layer of coal tar. Benzpyrene was ascertained in the atmosphere of the impregnation workshop, at the point of the fashioning of the tarred mountings, and in the air of the plant with reference to the possibility of further air pollution in nearby plants and housing lots. The highest concentrations (up to 288.0 micrograms/cu m) were found where the parts were turned. These high concentrations in the working atmosphere are due to high cutting velocity. Substitution of pitcoal tar for natural asphalt would remove the risk of carcinogenic hydrocarbons in the manufacture of cast metal mountings.

10299 APTIC NO. 28494

Gorodinskiy, S. M., E. I. Semenenko, G. A. Gaziyev, Ye. I. Kosterina, O. N. Shevkun, and T. G. Ivanova

SANITARY AND CHEMICAL STUDIES OF SOME POLYMERS.

Space Biol. Med. (English translation from Russian of: Kosmich. Biol. Med.), 4(4):17-26, 1970. 4 refs.

NTIS: JPRS 51641

To ascertain their suitability for use in pressurized manned chambers, various polymers were placed in an enclosed pressurized chamber and toxic compounds in their gas emanations were measured. The studies were conducted at temperatures up to 200 deg at reduced oxygen pressure (0.2-0.4 atm), and at atmospheric pressure. More than 25 materials were tested, including those based on polyvinyl chloride, caprolactaum, polycarbonate, polyurethanes, natural and synthetic fibers, rubbers, sealings, glass plastics, and plexiglass. The most toxic of these materials were glass plastics and sealings; the least toxic were rubbers and caprolite. The hygienic properties of polymers can be improved by vacuum processing, addition of stabilizers, heating, and washing with water. (Author abstract modified)

10300 APTIC NO. 28515

Ihle, Claus

WHY EXCESS PRESSURE IN THE COMBUSTION CHAMBER? (Wozu Ueberdruck im Feuerraum)? Text in German. Oel Gasfeuerung, 16(3):326-332, March 1971.

The principle of excess pressure is comming increasingly into use. A large number of boiler furnaces are now designed for the so-called excess pressure firing system, i.e., flue gas-side excess pressures of 20 to 50 mm water for cast-iron boilers and 30 to 100 mm water for steel boilers. Excess pressure boilers are more compact, require less space, and have a higher specific capacity. However, the high flue-gas speeds and the higher circumferential speed of the ventilator make them noisier than conventional boilers. In addition, the small flue-gas ducts which are necessary to obtain a high flue-gas speed make flue-gas cleaning more difficult. Finally, boiler and burner are not always tuned to each other satisfactorily.

10301 APTIC NO. 28519

ENVIRONMENT--CATASTROPHE -REPORTS.

(Umwelt--Katastrophen-- Meldungen). Text in German. Allgem. Forstztg., 26(1):82, 1971. 17 refs.

In Munich, 870 tons of dust with grain sizes capable of penetrating the lungs fall on the city each month. Automobile exhaust gases cause about 30% of air pollution. Dust from the Ruhr Valley in West Germany is carried as far as Sweden and Norway. The increasing air pollution promotes the risk of cancer. Pesticides on fruit and vegetables cause concern among health officials. Control legislation is not adequate nor do politicians take the air pollution situation seriously enough.

10302 APTIC NO. 28526

Rohde, Wolfgang and Wilhelm Weskamp

THE IMPORTANCE OF HEATING REVERSES FOR THE HEAT BALANCE OF HORIZONTAL CHAMBER FURNACES.

(Die Bedeutung des Beheizungswechsels fuer den Waermehaushalt von Horizontalkammeroefen). Text in German. Glueckauf (Essen), 107(6):222-228, 1971. 12 refs.

In a series of experiments conducted in a horizontal chamber furnace, the heat was reversed after 30, 20, and 10 min. A constant medium temperature was maintained during all heating reverses. Waste gas temperature and composition were continuously monitored. In all three experiments, the quality of the coke remained constant and the heat balance unchanged, although the waste gas temperature dropped by 20 C. The waste gas had a temperature of 194 C at 30 min heating reverses, a carbon dioxide content of 7.8%, and an oxygen content of 3.0%. At 20 min heating reverses, the waste gas temperature was 172 C, the CO_2 content 7.6%, the O_2 content 4.1%. At 10 min heating reverses, the temperature was 168 C, the CO_2 content 8.0%, and O_2 content 3.0%. No improvements of heat consumption were achieved by frequent heating reverses.

10303 APTIC NO. 28527

Hoshika, Yasuyuki, Tomohiko Ishiguro, and Yoshihiro Shigeta

ANALYSIS OF ODOR COMPONENTS FROM FEATHER RENDERING PLANTS.

(Feza kanetsu shoriji ni hassei suru gasu seibun no bunseki). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1): 99, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 10th, 1970.)

An analysis was made of the odorous gas emitted in the feather-meal heating process. For heating at 200 C, reaction with an organic qualitative reagent showed that the gas is positive for 2,4-dinitrophenylhydrazine, $H.CHO\text{-}H_2SO_4$, fuchsine sulfur dioxide reagent, and CH_3COCH_3 $KMnO_4$ tests. The central organoleptic radical was estimated to be unsaturated bondings (aliphatic or aromatic) and aldehydes. Gas chromatography of sample gas concentrated by liquid oxygen showed that the central substance contain acrolein and CH_3SH, CH_3CHO, CH_3CH_2CHO, and $n\text{-}C_3H_7nH_2$.

10304 APTIC NO. 28533

Curtis, Anthony

IS CLEANLINESS THREE-CORNERED? New Scientist Sci. J., 49(740):415- 417, Feb. 25, 1971. 1 ref.

The Wankel rotary engine, first revealed 11 years ago, is the first form of internal combustion prime mover to threaten the motor car's conventional piston unit. A single-rotor Wankel engine is equivalent to a twin cylinder four-stroke piston unit in the number of firing strokes produced per revolution of the shaft, and similarly a twin-rotor engine is equivalent to the popular four cylinder four-stroke unit. In a Wankel engine, however, each firing stroke lasts for 270 deg rather than 180 deg of output shaft rotation, so for smoothness of torque generation its performance is closer to a six cylinder four-stroke piston engine. Freedom from vibration is another advantage as the moving parts in each 'bank' of a Wankel effectively consist of a single crankthrow, easily balanced by a counterweight. Extreme lightness and compactness are two more advantages. For the generation of exhaust pollution, the Wankel's most important feature is its high surface-to-volume ratio which creates a quenching effect leading to the production of unburnt residuals at the end of the combustion process; but the very same cool-running conditions that encourage the production of unburnt hydrocarbons are those that inhibit the creation of these poisonous oxides. However, a Wankel engine equipped with a thermal reactor, perhaps boosted by the injection of additional air, is very likely to be capable of meeting the very stringent limits on carbon monoxide, unburnt hydrocarbons, and oxides of nitrogen set by the Federal regulations for 1975. The efficiency and reliability of a Wankel engine depend critically on the proper functioning of two kinds of gas seal: the rotor side seals and the rotor apex seals which between them contain the combustion pressures, as do the piston rings of a conventional unit. Methods of solving the sealing problem are indicated.

10305 APTIC NO. 28544

Matuo, M.

ON GAS BURNERS FOR BOILERS.

(Boira gasu baana ni tsuite). Text in Japanese. Netsu Kanri (Heat Management: Energy and Pollution Control), 23(2):20-26, Feb. 1971.

Several kinds of gas burners, automatic combustion control devices for gas-burning boilers, and safety devices for boilers are discussed. Brief descriptions of their basic mechanism are given. Two classifications of gas burners are used: the forced draft external-mix type, and the natural draft pre-mix type. The former classification is more widely used today and includes the ring-type gas burner, center-fire type, multi-lance type, center-fire type for low-pressure low-calorie gas, and scroll type. The ring type can be applied to practically all kinds of fuel gases including hydrogen city gas, and natural gas whose caloric value ranges from 2000-10,000 kcal/cu nm and gas pressure from about 0.1 to 0.5 kg/sq cm g. Like the ring type, the center-fire type finds a wide application and is used for liquid propane gas (LPG), refinery gas, natural gas, city gas, and hydrogen sulfide. A high carbon hydrogen fuel such as LPG or petroleum refinery gas is burned, mist contained in the gas is pyrolized and carbonized at the burner tip, thus damaging the burner if it is a ring-type. The multi-lance type in which the gas is jetted into the vortex air current in the burner throat through the gas ring header provided outside of the resistor is designed to avoid such a defect. The center-fire type for low-pressure low calorie gas, designed for combustion of blast furnace gas, formalin gas, or other waste gas containing a good deal of incombustible gases, it has a burner tip provided with several small compartments, through which gas and air are jetted alternately for speedy mixing of air with gas. The scroll type is also designed for combustion of low calorie, low-pressure gas like blast furnace gas. Automatic combustion control devices for gas-burning boilers are introduced and safety devices are discussed, including a prepurge, pressure switch, shutoff valve, and supervisory cock.

10306 APTIC NO. 28548

GULF'S VORTOMETRIC BURNER SPINS SAVINGS.

Can. Petrol., 1970, 5p., Dec. 1970. (Mechanical design and performance information provided in attached report entitled THE GULF CANADA VORTOMETRIC BURNER, 10 p., Oct. 1970.)

A highly efficient, low-pollution burner which creates a whirling vortex of fuel an/ air to achieve essentially complete and smokeless combustion of heavy petroleum fuels is described. In addition to the anti-pollution benefit, it offers 5% fuel savings, a wide range of efficient operation and reduced operating, control, and maintenance costs. At present, the burner is being produced in three sizes, 3 million, 20 million and 60 million But/hr nominal capacity, with scale-up to 120 million Btu/hr planned as the next step. Few sizes are necessary because of the burner's wide range of efficient operation. The turndown ratio of up to 20:1 makes the larger unit appropriate for nearly all applications in a typical oil refinery, in contrast to the six to eight burner sizes normally required, thus making possible a savings in space for parts inventory. The three main parts of the Vortometric burner are the air volute, the fuel atomizer, and the combustor. The atomizer is built around a straight fuel pipe through which only oil flows. The burner requires pressures of only 10-60 psig. Normal fuel viscosity at the atomizer is 150 SUS, but much higher viscosities can be accommodated. Steam at a nominal fixed supply pressure of 50 psig, less than half the atomizer pressure required in most industrial burners, forms the atomizing energy system around the fuel pipe. The formation of a vortex within the flame is the basic design feature of the system; by this means the reaction zone between fuel and oxidizer is controlled and located. Source of the energy required to generate the vortex and the geometry to control and shape the vortex is provided by the method of air supply.

10307 APTIC NO. 28560

Rixmann, W. and K. E. Hailer

CONTRIBUTION TO AUTOMOBILE TECHNOLOGY - A RETROSPECTIVE VIEW OF THE VDI/ATG MEETING IN MANNHEIM 1970.

(Beitraege zur Fahrzeugtechnik - Rueckblick auf die VDI/ATG-Tagung in Mannheim 1970). Text in German. (Automobiltechnische Zeitschrift) (Stuttgart), 73(2):62-71, Feb. 1971. 6 refs.

At the meeting of the expert panel on automobile technology (ATG) of the Association of German Engineers (VDI) in Mannheim, 1970, waste-gas emission from the rotating combustion engine, composition of exhaust gas from the FM-gasoline engine, and gas turbines for trucks were among the subjects discussed. Because waste-gas temperatures in Wankel engines are high (1000 to 1150 C), use of a hot flame reactor behind the engine is feasible. Ignition timing has been so optimized that exhaust gas temperatures remain rather high over the entire operation range. The air quantity in the waste gas is 20%. According to the California test, the exhaust gases contain 150 ppm hydrocarbons and 1.02% by volume carbon monoxide. The FM engine reduces noxious emissions by influencing combustion. The formation of nitrogen oxides in the FM engine corresponds approximately to that of the diesel engine. Fuels with a lower lead content will pose no problems for the FM engine. The 350 HP gas turbine still operates at temperatures around 920 C and without a heat exchanger. The latter is in the development stage. The emission level of the gas turbine is much lower than of diesel engines, and the exhaust gases are also less noxious than those of diesel engines. A maximum of 320 to 400 ppm of nitrogen oxides, 0.1 to 0.01% by volume CO, and 150 to 0 ppm hydrocarbons is presently emitted.

10308 APTIC NO. 28563

Selezneva, Ye. S. and V. M. Drozdova

THE NATURAL BACKGROUND OF ATMOSPHERIC CONTAMINATION AND THE COMPOSITION OF PRECIPITATION OVER THE TERRITORY OF THE USSR.

Sovremennyye Problemy Klimatologii, 1966: 292-299. 7 refs. Foreign Technology Div., Wright Patterson AFB, Ohio, Translation Div., 9p., 1967.

NTIS, DDC: AD 670893

Sampling data from over 70 stations were used to construct maps of the distribution of mineral salt impurities in precipitation over the Soviet Union. The average mineralization of precipitation is heterogeneous and varies from 5-10 to 30-35 mg l, although several points exceed the upper value considerably. The geographical changes in the content of the impurities are related to natural zonal changes; for example, the tundra and tayga zones show the purest precipitation, averaging only 10-15 mg/l of dissolved impurities. Variations with change of seasons and distance from marine shorelines are also noted. Precipitation picks up impurities both as they are formed and as they fall through the area beneath the clouds; therefore, the mineralization and composition of precipitation can be used to characterize the contamination of a considerable layer of the atmosphere. The maps show that the most highly contaminated air is in the southern regions of the European part of the USSR and in the Central Asiatic deserts. Calculations based on worldwide coal combustion suggest that sulfur from industrial sources amounts to not over 5% (or, for the entire earth, only about 2%) of the quantity washed out of the atmosphere, and that natural sources (oceans, soil, volcanoes) are considerably more productive. However, this estimate does not eliminate the problem of strong local contamination of the atmosphere.

10309 APTIC NO. 28564

Murphy, Zane E. and Harry Perry

AIR POLLUTION AND THE LIGNITE INDUSTRY.

Bureau of Mines Informatio Circ., no. 8376:113-125, 1967. 10 refs. (Technology and Use of Lignite, Proceedings Symposium, Grand Forks, N. Dak., April 27-28, 1967.)

Rising electric power demands have led to increased use of low-cost energy fuels such as lignite. With the widespread adoption of limits on allowable emissions from fuel combustion processes, it is essential that the lignite industry assess its future in light of the air pollution potential from the use of its product. Selected mining of reserves, sulfur reduction in fuel preparation, fuel additives such as limestone or dolomite, and various wet and dry processes for treatment of stack effluent are approaches to sulfur oxides control being considered or developed; but in view of presen technical limits on such methods and others for control of nitrogen oxides, the immediate trend is toward regulations which specify the use of lower-sulfur fuels. It is estimated that about 87% of the total estimated lignite reserve in N. Dak. contains 1% or less sulfur, indicating vast reserves of fossil fuel of low sulfur content in the state. Of the total 1965 lignite production in N. Dak., 97.9% had less than 1% sulfur and 87% less than 0.7%. However, while lignite is well recognized as a low-cost and low-sulfur fuel, it also has a low calorific value. Roughly twice as much lignite is required to produce 1 kilowatt-hour of electricity as compared with bituminous coal. Multiplying the sulfur content of a given lignite by a factor of two or slightly more places lignite into the medium or even high-sulfur classification by today's air pollution standards.

10310 APTIC NO. 28573

Kelly, C. I.

LIQUEFIED NATURAL GAS, PART III. PERFORMANCE OF STORAGE VESSELS ACTUALLY DESIGNED, BUILT AND USED.

Petrol. Times, vol. 62:178-181, Feb. 28, 1958.

The closing of a natural gas liquefaction, storage, and regasification (L.S. and R.) plant after a disastrous fire in 1944 temporarily obscured progress made up to that time. It is noted that two of the three spherical tanks in use did not catch fire, and that all three tanks were in satisfactory service for three and a half years. In 1947, under Lend-Lease, another L.S. and R. plant was fabricated in the U. S. for the U.S.S.R., near Moscow. I has functioned for nearly 10 years. Detailed descriptions of the construction details of all the storage vessels built and used are given, including the Cornwell pilot-plant storage vessel, the Cleveland unit's three spherical vessels, the Cleveland unit's toro-segmental cylindrical tank, and the storage box containing 10 rows each of 10 cylindrical vessels in the Moscow plant. It was suggested that the steel used in the Cleveland cylindrical tank was not suitable for a tank of that particular design because shock loads were concentrated at the columns and were transmitted directly to the circular girder, whereas shock loads transmitted to the spherical tank would be distributed over the bottom of the tank. There is a possibility that a flaw in the tank or its welding may have contributed to the failure. It is also suggested that the rock wool insulating fabric used in this tank, because of war-time shortages of cork, was a factor. The type of storage used in the Moscow facility, a cluster of small tanks, is easily expandable and is recommended where high-use factors are involved, a small full tank being more efficient than a large vessel partially filled. The Moscow unit satisfies many of the safety design recommendations of the U. S. Bureau of Mines.

10311 APTIC NO. 28588

HAZARDOUS PRODUCT PRODUCED BY ELECTRICAL INSULATION.

Natl. Bur. Std. (U. S.) Tech. News Bull., 54(3):54, March 1970. 2 refs.

The possible dangers to fire-fighting personnel of decomposition of polyvinyl chloride (PVC) wire insulation are noted. Decomposition of PVC in a fire situation follows two stages: a white hydrochloric acid mist is generated; a dark sooty smoke is produced. Although inocuous in appearance, the hydrochloric acid acts as primary irritant and corrosive agent to the respiratory system. Irradiation of a 6.5 sq in. sample of PVC with 2.4 watts/sq cm heat energy produced a hydrochloric acid concentration above 1600 ppm. From 1000-2000 ppm is considered dangerous on short exposure.

10312 APTIC NO. 28598

Kelly, C. I.

LIQUEFIED NATURAL GAS, PART IV. THE PROPOSED CHICAGO PLANT-STORAGE VESSELS DESIGNED BUT NOT BUILT.

Petrol. Times, vol. 62:215-219, March 14, 1958.

A liquefaction, storage, and regasification plant was planned in May 1949 to make full use of pipelines having a combined capacity of some 580 million cu ft on a peak day. This was 196 million cu ft more than the pipeline company was able to receive during such a peak day from their supplier. With the Cleveland disaster of 1944 in mind, the tanks forming part of the Chicago plant differed in basic design details, in the nature of the metal to come into contact with the cold liquefied gas, and in the size of the site and its location with regard to public safety. The storage tanks were to have inner containers of a copper-nickel alloy with outer shells of steel plate. An alternative design was a double corrugated copper inner tank surrounded by block insulation which i turn would be surrounded by lead, wood, and concrete walls. Surrounding the storage tank of either type would be earthen diking designed to contain one and one-half times the volumetric capacity of the tanks. The proposed site was remote farm land. Design sketches of the tanks and the proposed site are given. Comments concerning extraordinary hazards, specific hazards from fires, choice of material of construction, and general safety provisions are reported. The plant was never built; therefore, performance details could not be included.

10313 APTIC NO. 28604

Lownie, Harold W., Jr. and Thomas M. Barnes

THE NAPCA STUDY OF AIR POLLUTION IN THE STEEL INDUSTRY.

Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 40p., 1970. 3 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 63rd, St. Louis, Mo., June 14-18, 1970, Paper 70-96.)

Air pollution arising from sources in the steel industry was studie by review of the literature and by field visits to steel plants and manufacturers of control equipment. Major objectives were to determine the status of the technology of sources, characteristics of emissions, methods for their control, the cost of applying technology on a broader scale to diminish pollution from steel plants, and the subjects on which research, development, and demonstration projects are needed to improve the technology and economics of air pollution control. It is concluded that better emissions control equipment and systems and more rapid temperature- sensing instrumentation, as well as studies on more effective methods of conditioning metallurgical dusts for collection by electrostatic precipitators are needed. It is recommended that cos models be further developed to serve as a basis for estimating control costs. Highlights are given of a coking report which contains a detailed evaluation of technological alternatives for controlling emissions from the manufacture of blast-furnace coke, and which makes recommendations for further research, development, and demonstration projects relating to both conventional coking in slot ovens and new coking processes.

10314 APTIC NO. 28614

Okamoto, Yoshihiko and Norio Asakura

SURVEYS OF ENVIRONMENTAL POLLUTION EXHAUST GAS IN OSAKA CITY. PART I.

(Osaka shinai akushu haigasu chosahokoku). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1): 228, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

The obnoxious odor of white smoke emitted from an auto-parts foundr was investigated. White smoke is produced when molten iron is poured into moulding sand containing linseed oil and powdered tar-pitch as moulding agents. The lack of a hood on top of the cooling line had contributed to excess emissions of smoke. Source sampling was done with a high-volume air sampler. In addition, samples were collected 10 cm above the smoke source by means of three large baffles and 6% sodium carbonate solution. The solution turned yellow and upon cooling became a gel such as soap water. Water from the scrubber tower was also collected once every day for a week. To measure particle size, cascade impactors were placed at the top of the cupola and the cooling line, where over 50 of the separated particles were about 2.2 micron, and at the cupola ceiling, about 0.55 micron. The particles were mostly ferric oxide.

10315 APTIC NO. 28615

Kwon, S., M. Yoon, and I. Chai

AIR POLLUTION IN URBAN KOREA, PRESENT AND FUTURE.

(Kankoku no taiki osen genkyo). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):230, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

Due to the recent growth of the economy, the use of petroleum fuels in Korea has increased from 1.486 million Kl in 1965 to 6.373 million Kl of 1969. The amount of air pollutants emitted in Korea in 1969 was 1.123 million tons, of which about 36% came from heating facilities, 31% from factories, 24% from traffic, and 9% from steam power generation. The quantity of sulfur oxides emitted was mainly due to the combustion of C-heavy oil. In Seoul, the annual amount of pollutant emission is estimated to be at 148,608 tons or 242 tons/sq km. Data on annual variations since 1965 of sulfur dioxide, nitrogen dioxide, and suspended dusts are given for industrial, semi-industrial, commercial, residential, and greenbelt areas.

10316 APTIC NO. 28636

Kobayashi, Yoshitaka, Masahiro Hori, and Hisako Murata

COMBUSTION GASES GENERATING FROM POLYVINYL CHLORIDE AND ITS PRODUCTS: MODEL EXPERIMENT IN CASE OF FIRE.

Japan Plastics, 5(1):40-44, 48, Jan. 1971.

A study was made of the composition of gases generated by heating polyvinyl chloride raw materials and polyvinyl products at 300, 400, 500, 600, and 700 C. The results were compared with those obtained by heating natural high polymer materials at the same temperatures. A major part of the gases from the PVC materials consisted of hydrogen chloride and carbon dioxide, followed by carbon monoxide. Hydrogen chloride, carbon monoxide, and carbon dioxide concentrations reached maximum near 400 C, the temperature at which smoke generation was observed. Below 700 C, the ratio of carbon dioxide to carbon monoxide was constant; near 700 C, the ratio of carbon monoxide to carbon dioxide decreased, indicating that the PVC specimens were brought to complete burning by high temperatures. The amount of material burned was increased by increasing the air supply from 1 to 1.5 l/min. No hydrogen chloride evolved from the heating of the natural high polymer materials.

10317 APTIC NO. 28641

Medvedev, K. P. and V. M. Petropolskaya

FACTORS DETERMINING THE AMOUNT AND COMPOSITION OF ORGANIC SULPHUR COMPOUNDS IN COKE-OVEN GAS.

Coke Chem. (USSR) (English translation from Russian of: Koks i Khim., no. 7:32-35, 1970. 1 ref.

A study of the basic factors responsible for the total organic sulfur contents of raw and return coke-oven gases showed that free-space temperature is the most significant influence on the organic sulfur content of raw coke-oven gas. The lowest recorded value (757 C) corresponded to the lowest organic sulfur content, and the highest values (797-806 C) to the highest contents. The next most important factor is the volatile yield of the charge; as it increases from 25.5 to 26.6%, only 1.1%, the organic sulfur content of the raw gas goes from 535 to 903-943 mg/cu m. The organic sulfur content of the return coke-oven gas depends on the original amount in the raw gas and the condensation and recovery techniques applied. By simultaneously lowering the temperatures of cooling towers and increasing wash oil circulation rates, it is possible to reduce the organic sulfur in the return gas to 300-350 mg/cu m. The residual organic sulfur content can be reduced to 160-260 mg/cu m by compressing the return gas at 18-20 atm.

10318 APTIC NO. 28651

Yamada, Takeshi

MECHANISM OF GENERATING HARMFUL GAS IN COMBUSTION.

(Nensho ni okeru yugai gasu no hasseikiko). Text in Japanese. Netsu Kanri (Heat Management: Energy and Pollution Control), 23(2): 6-11, Feb. 1970. 10 refs.

The formation of sulfur oxides and nitrogen oxides during combustion was discussed. When sulfur-containing fuels are burned at an air rate of less than 1, free radicals such as SO, S, and SH are formed in addition to sulfur dioxide, hydrogen sulfide, and sulfur. All but SO2 decrease with the air rate approaching 1 and are no longer formed when the air rate is 1. The SO2 that remains becomes oxidized to SO3 in the presence of excess O2. The transformation of SO2 to SO3 at equilibrium at different temperatures was calculated and compared with the values obtained by actual measurement. More SO3 is formed at high-temperatures, even when excess oxygen is present, and the quantity of SO3 is far greater than the equilibrium value. Since the quantity of the substance formed can not exceed the equilibrium value, this was attributed to an oxygen atom which could oxidate SO2 to SO3. Based on this assumption, the function of the oxygen atom was mathematically analyzed. The speed to form SO3 from SO2 and O is 8 times faster than that to dissociate SO3 into SO2 and O. Nitrogen oxides which include NO and NO2 are formed through the reaction of O2 and N2 present in the combustion air at high temperatures. Formation of NOx can be minimized by using a combustion system in which the combustion temperature as well as excess O2 is kept at a minimum. The generation of NOx was reportedly reduced by 60% with 50% of exhaust gas recirculated. However, the catalyst system was not as effective as anticipated in the removal of NOx.

10319 APTIC NO. 28652

Takada, N., Shozo Matsuda, Masamichi Hara, Daihachiro Koyama, and Yoshihiro Nakagawa

EFFECTS OF FLUORIDE EMISSIONS FROM ROOF-TILE-KILN ON PLANTS.

(Uwagusurigawara seizo kojo haigasuchu fusso kagobutsu ni yoru shokubutsu haigai ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):226, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

Two ceramic plants which manufacture glazed shingles were investigated for fluoride emissions that were suspected of causing damages to agricultural products in the neighborhood. The items investigated were the original shingle material before glazing and firing and the exhaust gas from the kiln. In one plant, 1.7 to 4.1 ppm of fluorides were determined in the exhaust gas, and 3.0 to 4.4 ppm were found for the emissions from the other plant. Fluorides in air were measured by the JIS K 0105 method; from one plant, 20 ppb were recorded 210 m downwind. For the other plant, 43 ppb were discovered 73 m downwind. Further measurements were taken at six locations in a fan-shaped area downwind from the plant in the main wind direction, and 258 micrograms F(-)/100 sq cu/30 days were found 140 m southwest of the plants. The concentrations decreased with the distance from the source. When plants were analyzed, significantly larger amounts of fluorine were seen compared to those plants that were not damaged.

10320 APTIC NO. 28668

Bobo, D. L., E. L. Keitz, J. Morris, and K. E. Yeager

A SURVEY OF FUEL AND ENERGY INFORMATION SOURCES. VOL. II.

MITRE Corp., McLean, Va., Contract F19628-68-C-0365, Proj. 839C, Rept. MTR-1493, 625p., Nov. 1970.

NTIS: PB 197387

Fuel and energy questionnaires which are circulated by Federal agencies have been compiled. The agencies which have questionnaire include the Army Corps of Engineers, the Atomic Energy Commission, the Bureau of Census, Bureau of Mines, Federal Power Commission, Interstate Commerce Commission, Oil Import Administration, and the United States Geological Survey. The 77 questionnaires shown are0 completed but serve only to identify the date available from the distributing agencies.

10321 APTIC NO. 28673

Champagne, Donald L.

PARAMETERS AFFECTING THE MEASUREMENT OF AERO ENGINE EXHAUST SMOKE.

Air Force Aero-Propulsion Lab., Wright-Patterson AFB, Ohio, Fuel Branch, Proj. 3048, Task 304805, Rept. AFAPL-TR-70-23, 57p., Aug. 1970. 10 refs.

NTIS, DDC: AD 713612

A computerized statistical analysis of test data from aircraft engine smoke measurements is described. There are numerous systems in use for measuring exhaust smoke from aircraft engines. Most consist of drawing an exhaust smoke sample through a filter, measuring the light reflection from the resultant spot, and then comparing this to the light reflection from some standard. Unfortunately, results from different systems are not readily comparable, and the inherent precision of most of these systems has never been defined. In an attempt to prepare a reasonably simple, precise, and universally acceptable method for measuring exhaust smoke from aircraft engines, an analysis was undertaken of the filter medium, reflectometer, sampling flow rate, and the reflectometer background shade. Whatman No. 4 was found to be superior to Millipore SM as a filtering medium in this application. A MacBeth Model NB-100R, a W. W. Welch Densichron Model One, and a Photovolt Model 610 reflectometer were found to produce equivalent results. White reflectometer background shade was found to have slight superiority over black, yet black was recommended as a safeguard against unknown factors. The lower sampling flow rate (0.0041 scfs) was found to have produced slightly, yet consistently, higher smoke density readings than the higher flow rate (0.0085 scfs) tested. (Author abstract modified)

10322 APTIC NO. 28726

Tono, Ichiro and Sadao Akiyama

ON EVALUATION OF FACTORS AFFECTING INTER-CYLINDER COMBUSTION OF INTERNAL COMBUSTION ENGINE.

(Nainen kikan no shirindanai no nensho ni kansuru inshi no hyoka ni tsuite). Text in Japanese. Preprint, 4 p., 1970. 5 refs. (Presented at the Combustion Symposium, 8th, Osaka, Japan, Dec. 4-5, 1970, Paper 28.)

Inter-cylinder combustion is affected by factors that vary according to conditions on the intake side and hysteresis marked by the preceding cycles. Therefore, no cycle can be independent of other cycles, and inter-cylinder combustion should be evaluated by analyzing a continuous series of cycles rather than one particular cycle. The factors affecting combustion should be deemed constantly changing within some deviation from their mean values. This deviation or variation is usually more conspicuous when the engine is in idling. An experiment designed to evaluate these factors in idling operation was conducted on a 4-cycle engine, using specially designed measuring equipment comprising an analog data recorder. The data obtained included pressure waveform, continuous values for carbon monoxide density, equivalent stroke sampling pulse, crank-angle pulse, and pulse waveform at ignition time or any other desired point. A time series indication of the indicated mean effective values and polytropic indices obtained at idling are shown. According to the indication, the polytropic index is considerable at the initial stage of compression and reaches a practically constant value as the compression progresses. The fact that the polytropic index is extremely small when the indicated mean effective value is great indicates that, even during the expansion stroke, combustion is still going on due to after-burning. The pressure waveform representing the relationship between angle of the crank and the inter-cylinder pressure is also shown. Polytropic index, heat generation, and inter-cylinder gas temperature curves, all at the time of idling operation, are presented.

10323 APTIC NO. 28740

Iizawa, E., Koichi Yoshida, Shosuke Koike, and Yujiro Tsukamoto

MEASUREMENT OF CO CONCENTRATION.

(Shigaichi sokoji no CO nodo no sokutei ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):250, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

The carbon monoxide concentration in automobile exhaust gas under driving conditions was obtained by means of an equilibrium type recorder, a chassis dynamometer, a total bag, and nondispersive infrared analyzer. The car was a 2000 cc, 6-cylinder station wagon The average speed for the driving test was 10-24 km/hr, and the exhaust quantity per km was 1200-2000 l. Cyclical driving tended to reduce the exhaust gas volume. Measured CO concentrations showed a trend similar to the total exhaust gas quantity. At higher speeds, the CO concentration was lower. For each driving interval, the exhaust coefficient for CO was obtained from fuel consumption and CO exhaust quantity. During cyclical driving, little difference was observed between the calculated CO concentration and that obtained by means of the total bag, although CO concentration was smallest during the four-mode driving test. Data on vehicle speed (km/hr), CO(%), and exhaust gas volume for different driving courses are given.

10324 APTIC NO. 28745

Slater, William L. and John C. Ahlborn

PRODUCTION OF SYNTHESIS GAS.

(Texaco Inc., New York, N.Y.) U. S. Pat. 3,556,751. 4p., Jan. 19, 1971. 6 refs. (Appl. April 5, 1968, 11 claims).

Improvements in the partial oxidation process for generating hydrogen and carbon monoxide or in the manufacture of reducing gas or in the production of a high B.t.u. fuel gas are presented. The feedstock for a partial oxidation gas generator comprises a mixture of carboniferous fuel and about 1 to 80 wt. percent of an oxygenated hydrocarbonaceous organic material which supplies the feedstock with a minimum of 0.5 wt. percent of combined oxygen. The product gas comprises CO and H2 together with minor amounts of H2O, carbon dioxide, methane, and unconverted carbon. By reacting isobutyraldehyde or molasses with heavy fuel oil or vacuum residuum, the concentration of CH4 in the product gas may be increased while the free oxygen consumption and the reaction temperature at a given level of soot production and steam/fuel ratio is decreased.

10325 APTIC NO. 28776

Tatsukawa, R. and Tadaaki, Wakimoto

PESTICIDE RESIDUES IN AIR. PART II. AIR POLLUTION BY BHC.

(Noyaku ni yoru taiki osen. Dai-2-ho. BHC ni yoru taiki osen). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):92, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

Air pollution due to benzene hexachloride (BHC) in the Matsuyama area was investigated by means of a glass tube filled with Florisil (60-100 mesh) coated with 5% glycerine, and attached to a small pump. The recovery of BHC (alpha, beta, and gamma), Dieldrin, and p,p'-DDT was 98-100%. The concentration of BHC observed demonstrated areal and temporal variations. In spring, the BHC concentration in rice fields before spraying was 0.127 micrograms/cu m; it was 0.054 micrograms/cu m in urban areas. After spraying, the concentration in the city increased to about 1.38 micrograms/cu m. The increase was not directly due to the spraying but a result of BHC evaporating from the surface of rice paddies and plants. The pollution was relatively lower on rainy days. Also, according to the vapor pressure and stability differences between BHC isomers, regular variations could be observed between the ratio of isomer concentrations.

10326 APTIC NO. 28779

Hishida, Kazuo and T. Kiguchi

CONTROL OF AIR POLLUTION IN THE CASE OF DISTRICT HEAT AND COOLING PLAN.

(Chiiki danreibo keikaku ni okeru taiki osen boshi taisaku). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):180, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

In terms of air-pollution control, areal heating has the advantages that all emission sources can be collected together and savings in fuel and reduction of air pollution effected by good heat management. In terms of total energy planning, the advantages include possible utilization of urban and industrial solid wastes as a source of heat, utilization of waste heat from atomic power generating stations, and storage of excess energy that is not used at night for use in the daytime. The benefits of areal heating with regard to air pollution control are illustrated by the example of Shinjuku in Tokyo. In the winter of 1968, Shinjuku consumed 317 kl/day of heavy oil; at the present rate, it is estimated that 490 kl/day will be burned by 1977. This is the equivalent of 30.18 tons/day of sulfur dioxide emissons However, as a result of adopting an areal heating and cooling plan in 1969, pollution will be reduced by 5.64 tons/day of sulfur dioxide, 8 tons/day of carbon monoxide, 140-700 kg/day of dusts, and 200 kg/day of nitrogen oxides.

10327 APTIC NO. 28781

Yoshikawa, H., Y. Takabayashi, H. Osaka, T. Hasegawa, and S. Hirao

INVESTIGATION OF SMOKE IN GLASS FURNACES.

(Garasu yoyuro no baijin chosa). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):183, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

Smoke from fusion furnaces of glassware manufacturing plants was investigated with respect to dusts, sulfur oxides, air ratio, and penetration rate. The concentration range for dusts was 0.13-0.21 g/N cu m. For a factory manufacturing glass parts for optical instruments, the average was 0.46 g/N cu m. For a thermos manufacturing factory, the average was 0.66 g/N cu m. Since the process involves very high temperatures for the production of hard glass, the amount of dust decreases very rapidly after the operation has begun. Ways of preventing pollution include recombustion of waste gas at a high temperature, maintaining the viscocity of the fuel by adding low-viscocity fuel such as kerosene, and avoiding drastic cooling of the furnace.

10328 APTIC NO. 28783

Hayashi, Hideo, Masahiro Yoshida, Masaaki Takahashi, Toshio Hasegawa, and Yoshiaki Yamasaki

REMOVAL OF FLUORIDES BY PACKED TOWER.

(Juten to ni yoru fukkabutsu no jokyo). Text in Japanese. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

The emission of fluorides from a hydrofluoric acid and aluminum fluoride manufacturing plant was investigated. The measurement was based on JIS-KO105-67, according to which gas is passed through three glass filter plates and through two serially arranged absorption bottles containing 0.1 N sodium hydroxide solution. For the emission from the reaction tank in the aluminum fluoride process, which generates a large amount of water vapor, the gas was separated from the mist before going to the filters by means of a trap. The samples were analyzed by alizarin complexion method. The gas emission from the absorption tower for hydrofluoric acid was 6.6-32.8 F mg/N cu m; that for gas leak was 115.6 215.4 F mg/N cu m. Since the absorption tower recycles the used water, the amount of fluorides tended to increase with the increase in the hydrofluoric acid concentration. For aluminum fluoride, when the synthesis began, the temperature inside the reaction tank rose and the amount of water vapor increased. The concentation of F in the mist was as high as 27.4 mg/N cu m; in the gas it was 17.9 mg/N cu m. The treatment efficiecy of the absorption tower was 78-99%.

CONTROL METHODS

10329 APTIC NO. 27888

Bodoni, Desider

PROCESS AND EQUIPMENT FOR THE RECOVERY OF USABLE COMPONENTS FROM FLUE GASES.

(Verfahren und Einrichtung zur Gewinnung der verwertbaren Anteile von Rauchgasen). Text in German. (Bodoni and G.m.b.H., Vienna (Austria) Austrian Pat. 174,896. 4p., May 11, 1953. (Appl. April 24, 1951, 9 claims).

An installation consisting of a battery of absorption vessels filled with alternating layers of coke and Raschig rings, a boiler heated by a burner using coke dust and oil, and a number of heat exhangers is described in which carbon dioxide is recovered from flue gases generated by the burning of the coke dust and oil mixture (the flue gases contain about 18% CO2) by washing with an aqueous solution of triethanolamine, monoethanolamine, and potassium carbonate in a 2:2;1 ratio. The flue gas enters the absorbers at the bottom and rises against a spray of washing liquid which is diffused by jets under pressure. The coke and Raschig rings provide for large surface contact between the gas and the washing liquid. Absorbable components are thus removed from flue gases by 98%; the remainder is almost pure nitrogen which can be compressed and bottled. The preheated and enriched washing solution from the absorbers is heated in the boiler and CO2 is expelled to be subsequently dried, compressed, and bottled and the washing solution is returned to the absorbers.

10330 APTIC NO. 27889

Tartler, Georg and Adalbert Kewitsch

THE REMOVAL OF VIRUSES FROM AIR BY AIR FILTRATION.

(Ueber die Entfernung von Viren aus der Luft durch Luftfiltration). Text in German. Arch. Exp. Veterinaermed., vol. 21:359-366, 1967. 13 refs.

Experiments were conducted to test the degree of removal of viruses from the atmosphere by two degerminators. The degerminators work on the principle of circulating and filtrating air through glass wool filters and evaporating triethylene glycol. The Escherichia coli bacteriophage OX-174 was dispersed by means of an aerosol sprayer; air samples were taken form the atmosphere on both sides of the degerminator on 1.5% agar substrate, and the germs were counted following a 12 hour incubation. With high bacteriophage emission the degerminator removed 80% of the germs. With low phage emission, 86-90% removal was achieved. The filter is effective even at a saturation level of 6.9 times 10 billion phages. Maximum degermination was reached after a 64 minute operation of the degerminator after the air was exchanged 8 times. When the degerminator was not in operation, the germ count after 64 minutes was 268 while it was negligible with the degerminator in operation. Results with the type A influenza virus in allantoin were comparable with the results obtained with bacteriophages.

10331 APTIC NO. 27892

Rein, Barry D.

OBTAINING BOILER FUEL GAS TO REDUCE AIR POLLUTION: THE POLICY OF THE FEDERAL POWER COMMISSION.

Law Contemp. Probl., 33(2):399-420, Spring 1968. 44 refs.

A particularly important aspect of utilities regulation is the jurisdiction of the Federal Power Commission (FPC) over the use by steam-generating utilities of natural gas for boiler fuel, for the purpose of reducing air pollution produced by burning alternative fuels. Attempts to obtain natural gas for boiler gas fuel have run into the FPC's 'end use' policy, based on the Commission's asserted duty to conserve gas, a wasting asset. Uses adjudged to b in the public interest are those for which no other fuel is equivalent to gas or provides the same technical and economic advantages. Other end uses, including use as boiler fuel, are deemed inferior to the necessity to conserve gas. As the need for boiler fuel gas for air pollution abatement becomes more pronounced and as data accumulates on the effect of utility emissions on health and property, there is reason to believe that the Commission may be more willing to expend quantitites of natural gas as a partial interim solution to man-made ecological disturbances. Considering the imminent development of new energy sources and the eventual development of methods of cleaning effluents from coal and oil thermoelectric generation, a change of policy will not seriously threaten the country's gas reserves.

10332 APTIC NO. 27896

Attwood, W. A. and W. B. Lawrie

THE FORMATION AND PREVENTION OF ATMOSPHERIC CONTAMINATION IN FACTORIES.

Trans. Manchester Ass. Eng., 1953-1954: 19-64. 27 refs. (Presented at the Manchester Association of Engineers Meeting, Oct. 16, 1953.)

Atmospheric contaminants exist in the form of dust, smoke, fumes, sprays, vapors, and gases and are being produced in ever increasing quantities as a result of the development of new processes and of modernization of old processes. The hazards fall into two main categories: danger to health from specific diseases and also from many forms of industrial poisoning; and danger from fire and explosions. The latter danger arises with many different everyday dusts and also from vapors of inflammable liquids. This paper identifies processes producing there hazards and methods of reducing them. Part I is devoted to a brief summary of the general problem and of legal requirements. Part II provides a more detailed description of the methods adopted in iron and steel foundries, where the problems are particularly difficult. Special attention is paid to local exhaust ventilating systems, such as those for grinders. A new technique, which allows dust of the respirable size-range to be both seen and photographed on a fine film, makes it possible to explore the aerodynamics of local exhaust ventilation systems, by reference to dust movement. It would appear, therefore, that local exhaust ventilation systems should be designed and tested with reference to dust flow rather than air flow.

10333 APTIC NO. 27901

Balakrishnan, S. and R. N. Rickles

BY-PRODUCT RECOVERY AND AIR POLLUTION CONTROL.

Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 19p., 1970. 9 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 63rd, St. Louis, Mo., June 14-18, 1970, Paper 70-111.)

Practical applications of the concept of by-product recovery from air streams were studied. Valuable by-products may include a major product that is collectable in a commercial form such as iron ore dust from blast furnace gas effluents; a major product collectable in a non-commercial form such as dilute solution; and a saleable or presently usable by-product such as the recovery of chemicals from Kraft spent liquor. General methods for treating gaseous wastes include adsorption, absorption, ion exchange, membrane permeation, and chemical reaction. By product recovery is described for paper and pulp mills, petrochemical industries, the fertilizer industry, the organic chemicals industry, and the inorganic chemical industry. Production of chlorine from hydrochloric acid and product recovery from flue gas treatment are also described. The choice of a method of treatment depends on the economic considerations and degree of treatment desired. Removal of pollutants to the desired level is generally achieved through conventional processes, but it should be realized that the same degree of treatment can be achieved either by product recovery alone or by a combination of product recovery and conventional treatment processes. The advantage of reducing pollutional load through product recovery consists in the overall reduction of the cost of treatment and conservation of natural resources.

10334 APTIC NO. 27915

Fujii, Tomatsu

PNEUMOCONIOSIS CAUSED BY 'SENDO' DUST AMONG RUSH-MAT WORKERS.

(Kaen gyosha no 'i' kusasendo ni yoru jinpai). Text in Japanese. Nihon Igaku Hoshasen Gakkai Zasshi (Nippon Acta Radiological), 30(3):266-286, June 1970. 14 refs.

A mass chest X-ray program was initiated to determine if rush-mat workers develop pneumoconiosis due to the 'sendo' (a type of clay used to dye rush) dust to which they are exposed. Among 420 workers in domestic rush-mat workshops, there were 45 cases of Rx (suspicious), 16 of 1P, 19 of 2P, and 3 of 3P. Among 303 employees of commerical rush-mat plants, there were 18 cases of Rx, 22 of 1P, 12 of 2P, and 3 of 3P. The incidence of pneumoconiosis among workers engaged in preparing the rush was 36.1%. Pneumoconiotic modules found in the X-rays were mainly composed of punctiform opacities from 0.5-1.0 mm in diameter and were evenly distributed throughout the lungs. These findings are similar to those reported for some types of atypical silicosis and for other types of nonsilicotic pneumoconiosis, especially pneumoconiosis caused by inhalation of clay dust. Among other observations, it is noted that vascular markings were not heavily deformed and that Hilar shadows showed no enlargement. Pulmonary emphysema was not conspicuous and no case of active pulmonary tuberculosis was observed. Of 47 workers with distinct pneumoconiosis, 17 had slightly impaired lung function and 6 moderately impaired lung function. At present, the periodic rotation of personnel appears to be the only way of protecting workers from the onset of pneumoconiosis. (Author abstract modified)

10335 APTIC NO. 27916

Kriz, Milan

DRY FLUE GAS DESULFURIZATION METHODS.

(Suche zpusoby cisteni kourovych plynu od kyslicniku siry). Text in Czech. Sklar Keramoz 15(12):374-376, 1965. 25 refs.

Dry desulfurization methods used outside Czechoslovakia are reviewed. All methods described limit the absolute quantity of sulfur dioxide emitted into the atmosphere with the flue gas and operate at temperatures exceeding the dew point of sulfuric acid in flue gases. The three most advanced processes are based on the absorption of SO2 by metal oxides in powder or granulated form, on the adsorption of SO2 on carbonaceous materials, and on the catalytic oxidation of SO2 in gaseous form on a metal catalyst. The first method (U.S. Bureau of Mines) works with alkalized alumina in a 64 to 31 ratio of aluminum oxide to sodium oxide with the absorbent in an absorber used in the form of a falling cloud. Regeneration is accomplished by gas containing hydrogen or carbon monoxide. The second process (Reinluft G.m.b.H., Essen) adsorbs SO2 on semicoke at 70-120 C, oxidizes it to sulfur trioxide which is then converted by hydration to sulfuric acid. The third process (Bituminous Coal Research Co.) avoids recirculation of the absorbent and adsorbent of the first two processes and produces sulfuric acid directly without a regenerative cycle. The catalyst used is the Monsanto vanadium catalyst T-748 which converts SO2 in the flue gas, which has been electrostatically deprived of fly ash, to SO3 at 400 C and processes it further to 70% H2SO4. Neither of the three processes pays for itself from the sale of the recovered sulfuric acid; all are complicated and expensive to install.

10336 APTIC NO. 27918

Benforado, David

CONTROL BY INCINERATION.

American Inst. of Chemical Engineers, New York, American Inst. of Mining, Metallurgical and Petroleum Engineers (AIME), New York, N. Y., American Society of Civil Engineers, New York, American Society of Heating, Refrigerating and Air-Conditioning Engineers, New York, American Society of Mechanical Engineers, New York, and American Society for Testing an Materials, New York, Engineering Foundation, Proc. MECAR Symp. New Developments Air Pollution Control, New York, 1967, p. 99-109. 3 refs. (Oct. 23.)

Incineration is an air pollution control process in which objectionable organic solvent vapors or organic particulates are converted to harmless carbon dioxide and water. Two incineration methods are available: direct flame incineration and catalytic-type incineration. In direct-flame incineration, organic emissions are destroyed by exposure to temperatures of 1000-1400 F in the presence of a flame. Direct-flame incineration systems can operate continuously at efficiencies of 90-99 plus%. Heat recovery equipment makes the operating costs of these sytems reasonable, and capital investment can be paid out in a relatively short time. A recent development in solvent applications of direct-flame incineration is the adoption of the raw gas burner, which uses the oxygen in the exhaust flame for combustion. In catalytic-type incineration, incineration takes place at lower temperatures in the absence of a flame and in the presence of a catalyst. Heat recovery equipment is justified only where temperatures of 800-1200 are justified. Although efficiencie of 85-92% have been reported for catalytic incineration systems, no device tested by the Los Angeles Air Pollution Control District has met the required efficiency of 90% or above.

10337 APTIC NO. 27924

Teller, Aaron J.

ADVANCES IN NOXIOUS GAS CONTROL.

American Inst. of Chemical Engineers, New York, American Inst. of Mining, Metallurgical and Petroleum Engineers (AIME), New York, N. Y., American Society of Civil Engineers, New York, American Society of Heating, Refrigerating and Air-Conditioning Engineers, New York, American Society of Mechanical Engineers, New York, and American Society for Testing and Materials, New York, Engineering Foundation, Proc. MECAR Symp. New Developments Air Pollution Control, New York, 1967, p. 91-96. (Oct. 23.)

The application of cocurrent and cross flow design to recovery of noxious gases is discussed. These designs have gas-phase pressure drops about one-third to one-half that of equivalent countercurrent designs and also permit the use of smaller equipment. Further, they can handle particulates in the gas and achieve high irrigation rates at low liquid consumption and low pressure drop. Because higher irrigation rates at low pressure drop result in higher mass transfer efficiencies than those obtainable with countercurrent designs, the packed depth for cocurrent and cross flow designs is often less than for countercurrent design. The new designs specifically utilize the phenomenon of surface renewal, or absorption accompanied by chemical reaction, to improve mass transfer kinetics.

10338 APTIC NO. 27938

Bakke, Even and Sydney H. Reiter

AN ECONOMIC OPTIMIZATION OF A VENTURI SCRUBBER WITH A CYCLONIC WATER SEPARATOR.

Preprint, Air Pollution Control Assoc., Pittsburg Pa., 35p., 1970. 6 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 63rd, St. Louis, Mo., June 14-18, 1970, Paper 70-7.)

The design of venturi scrubbers with cyclonic liquid separators has been optimized by balancing the fixed charges against the power consumption costs. A mathematical model describing the scrubbing action, the liquid drop separation, and the pressure losses through the unit was developed. The complete set of equations were organized in a cause-and-effect sequence and programmed together with cost information. The resulting computer program permitted a complete design of the scrubber and separator. Two scrubbers with separators were tested in the laboratory to check predicted efficiencies, spin heights, and pressure drop. Their size difference 1,500 CFM to 20,000 CFM, gave a more than 10:1 check on scaling accuracy of the mathematical model. By utilization of the existing theory and experimental data on scrubber collection efficiency, it was possible to predict the venturi efficiency within the experimental error of the efficiency measurements for a test dust over a wide range of pressure drops and scrubber liquid rates. The separator spin height was predicted by writing the basic equation of motion for a liquid drop and the resulting non-linear differential equations were impossible to solve analytically, but by digital simulation it was possible to obtain a numerical solution for a given set of initial and final conditions. The separator spin height decreases with increasing separator inlet velocity but the separator pressure drop increases with increasing inlet velocity; by calculating the operating cost of the separator, which is the sum of fixed charges (increases with spin height) and fan power costs (increases with pressure drop), a minimum operating cost was shown to exist for a specific inlet velocity. (Author abstract modified)

10339 APTIC NO. 27939

Musick, James K.

HOPCALITE-CATALYZED COMBUSTION OF ATMOSPHERIC CONTAMINANTS AT LOW CONCENTRATION.

In: Chemical Research in Nuclear Submarien Atmosphere Purification. (Progress Report.) Naval Research Lab., Washington, D. C., Chemistry Div., Rept. NRL 7037, Chapt. 2, p. 11-16, June 2, 1970. 1 ref.

NTIS,DDC: AD 709896

Results are reported of experiments using Hopcalite catalyst to oxidize carbon monoxide under hyperbaric conditions in mainly helium atmospheres, and in the presence of n-decane, a paint thinner, or R-12. The catalytic combustion of thiophene was also studied in a preliminary investigation of sulfur compounds in the CO/H2 burner. Hopcalite catalyst at 600 F completely removed CO from a simulated SeaLab atmosphere (1.7% O2-98.3% He) at pressures up to 300 psig. Based on experimental results and the experience of SeaLab II, a catalytic burner was built for Sealab III, designed to process 4 cu ft/min of atmosphere, or alternatively 8 cu ft/min when modified by the substitution of a larger air pump. Hopcalite at 600 F effectively oxidized CO in the presence of n-decane or R-12 in relatively large concentrations (to 150 ppm). With 40 to 100 ppm thiophene in the burner influent, Hopcalite at 600 F oxidized 40 to 50% of the input. Higher percentages of thiophene were oxidized early in a run, particularly by fresh catalyst. The porportion oxidized appeared to vary with the concentration of thiophene in the influent. No sulfur dioxide or hydrogen sulfide was detected in the effluent from a catalytic burner oxidizing thiophene. However, a trace of acid was detected in some instances. (Author conclusions modified)

10340 APTIC NO. 27964

Staubing, Peter

POLLUTION PROBLEM AND POLLUTION CONTROL IN HARDENING SHOPS.

(Abluft-Probleme und Abluft-Reinigung in Haertereien). Text in German. Wasser, Luft Betrieb, 15(2):52-58, Feb. 1971. 5 refs.

In the metal hardening trade, most toxic and noxious gases issue from salt and from metal baths, from solid and powder heat treatmen compounds and from propane, butane, ammonia and trichloroethylene. The gases and vapors formed by heat generated during the hardening process and by contract of the salts with humid air (HCN in the case of cyanides) must be removed by ventilation which should be so placed as to remove the pollutant as its site of formation. The calculation of exhaust installations (flow velocity), the dimensioning of ventilators, protection of exhaust installations against corrosion, the construction of variou types of exhausts and hints for the operation of exhaust installations are reviewed. Gaseous pollutants can be removed by wet separators, by cyclones, by bag filters, by fabric filters and by electrofilters. Popular air filter installations with activated charcoal. Gases of low boiling point like carbon monoxide, ethylene, ammonia, formaldehyde, hydrochloric acid or hydrogen sulfide are either not absorbed at all or only incompletely by charcoal and must, if present, be removed by catalytic oxidation at 250-300 C with the help of metal catalysts.

10341 APTIC NO. 27974

Iijima, Ayumi

A NEW ELECTRIC DUST COLLECTION DEVICE.

(Denki shujin sochi). Text in Japanese. (Origin Electric Co. (Japan)) Japan. Pat. Sho 45-31519. 3p., Oct. 12, 1970. (Appl. Sept. 7, 1965, claims not given).

A new electric dust collection device is described which eliminates knocking off the dust accumulated on the electrodes. This is accomplished by creating a static repulsion between the electrodes and the accumulated dust, causing the dust to fall off without having to stop the operation of the collector. With this device, the amount of dust accumulated is detected, and the polarity of the collection board and the discharge is reversed when a certain amount is exceeded. The amount of accumulated dust is detected on the basis of the critical voltage generated by the electric current by corona discharge. Although this device depends upon the inversion voltage,about 1/10th or perhaps a little more force than that required in the traditional mechanical knocking out system would be sufficient to obtain the same effect, while reducing the damage to the discharge line.

10342 APTIC NO. 27975

Appelhans, Hermann and Wolfgang Schuman

METHOD OF AND APPARATUS FOR BURNING REFUSE.

(Assignee not given.) U. S. Pat. 3,543,702. 9p., Dec. 1, 1970. 4 refs. (Appl. Dec. 30, 1968, 14 claims).

A method and apparatus for burning refuse are described, wherein the refuse is fed during its circulation in a circular path successively through a dry zone, a burning zone, and a cooling zone, and thereby is subjected to continuous feed of burning or combustion air. In addition, the refuse is lifted and aired during the burning phase. To warrant a sufficient oxygen feed for the furthering of the burning process, refuse is forcibly turned in other methods. This continuous movement may cause the burning processes to be choked, while also producing relatively large quantities of dust which must be precipitated. The present apparatus is characterized in that the furnace has an annular tunnel in which an annular grate rotates, provided with a feeding station, a drying station, and a burning and cooling zone, a discharge station, and means for feeding combustion air from the bottom of the annular grate. In the center of the oven is an afterburner chamber having a waste gas opening for communication with the burning chamber, and a dust removing device is operatively connective with the afterburner chamber. (Author abstract modified)

10343 APTIC NO. 27976

Baigas, Joseph F., Jr., Richard G. Nolte, Peter M. DeVita, and James E. Neinast

AIR PURIFYING INCINERATOR APPARATUS.

(Environmental Control Products, Inc., Charlotte, N. C.) U. S. Pat. 3,543,700. 13p., Dec. 1, 1970. 3 refs. (Appl. July 7, 1969, 19 claims).

An air purifying incinerator apparatus is described which comprises an independent secondary combustion chamber for receiving and burning products of incomplete combustion from a main combustion chamber. The apparatus also includes means for introducing secondary air tangentially into the secondary combustion chamber, as well as selectively operable burner apparatus for introducing an elongate flame to maintain a predetermined temperature and to aid in causing a generally cyclonic flow of the products of incomplete combustion and the secondary air. A heat exchanger chamber is preferably provided in the exhaust stack for heating the secondary air, and an incandescent screen may be provided in the secondary combustion chamber as an additional burning medium and a partial obstacle to the flow of the products of incomplete combustion.

10344 APTIC NO. 27977

Hardison, Leslie C.

CENTRIFUGAL PARTICLE SEPARATOR.

(Universal Oil Products Co., Des Plaines, Ill.) U. S. Pat. 3,543,485. 5p., Dec. 1, 1970. 8 refs. (Appl. Sept. 23, 1968, 4 claims).

An improved vertically aligned centrifugal particle separator is described, wherein a multiplicity of static vanes extend upward from and are circumferentially fixed around a static spinner. The spinner has a hub and blades and is axially mounted over a particle laden gas inlet. A gas stream rising from the gas inlet is forced into an ascending spiral by the spinner blades. Relatively dense particles entrained in the gas stream are thrown centrifugally outward and are either passed between static vanes or strike them, but in either case are deflected into a particle receiving section. Previous centrifugal particle separators were designed to remove entrained particles which follow air currents flowing through the separator, and have been predominantly used to remove dust particles of fine and moderate size. (Author abstract modified)

10345 APTIC NO. 27978

Sheehan, John James

SEPARATOR APPARATUS.

(Buell Engineering Co., Inc., Lebanon, Pa.) U. S. Pat. 3,543,483. 7p., Dec. 1, 1970. 21 refs. (Appl. July 6, 1967, 14 claims).

A dust collecting apparatus for removing solid materials from a gaseous stream is described, which includes a plurality of collecto units with filter members disposed in dust separating and/or collecting communication within the collector units. Deflection elements are disposed in association with the filter members, and magnetic elements are disposed adjacent the filter members to periodically impart a shaking motion to the filter members for removing collected dust. Previous methods for removing deposited dust generally involved an interruption of operation, while also causing increased wear on the equipment. (Author abstract modified)

10346 APTIC NO. 27979

Pausch, Josef

HIGH PRESSURE CLEANING OF DUST SEPARATING APPARATUS.

(Aerodyne Machinery Corp., Hopkins, Minn.) U. S. Pat. 3,543,481. 6p., Dec. 1, 1970. 7 refs. (Appl. Aug. 3, 1967, 3 claims).

A method and means are described of removing accumulated solids from the porous material forming one or more filtering surfaces by the use of gas under a relatively high pressure, and in sufficient volume to a confined space on one side of the filtering elements so as to almost instantaneously remove the accumulated solids. Previous systems would become inefficient when the dust loading was very heavy as they did not provide enough pressure and volume of air.

10347 APTIC NO. 27985

Schrag, Maurice P.

DUST COLLECTOR AND FILTER THEREFOR.

(Carter-Day Co., Minneapolis, Minn.) U. S. Pat. 3,545,180. 9p., Dec. 8, 1970. 12 refs. (Appl. Aug. 26, 1968, 3 claims).

An air filter is described which includes a frame defining an opening, a generally vertical mounting surface surrounding the opening, and a vertically disposed flexible porous screen covering the opening and having a marginal edge secured to the mounting surface. The screen is disposed in a substantially neutra state without sagging under its own weight in its vertical position, but is adapted to be stretched and deflected to a predetermined degree by pressure of air moving through the opening. A filter cleaner comprises a suction head movable parallel to the plane of the screen and operative to negative air pressure in the suction head to deflect adjacent portions of the screen away from its neutral condition. (Author abstract modified)

10348 APTIC NO. 27989

Yagi, Shizuo, Kazuo Nakagawa, Akiro Ishizuya, Shuichi Yamazaki, Yasuhito Sato, and Masaharu Sekiguchi

ENGINE-BRAKE INTENSIFYING DEVICE FOR SPARK-IGNITION TYPE INTERNAL- COMBUSTION ENGINES WITH AN AIR-POLLUTION PREVENTION SYSTEM.

(Honda Giken Kogyo Kabushiki Kaisha, Tokyo (Japan)) U. S. Pat. 3,547,088. 14p., Dec. 15, 1970. 5 refs. (Appl. April 1, 1969, 4 claims).

Conventional air pollution prevention devices incorporated in spark ignition engines have principally involved a certain limitation on the extent of throttle closing, resulting in a reduced engine brake effect. This difficulty can be overcome by arranging in the ignition system an additional contact breaker which is operable with an ignition timing retarded relative to that of the normal contact breaker. The additional breaker is rendered effective in place of the latter, when the engine brake is applied, to rapidly reduce the power output of the engine. (Author abstract)

10349 APTIC NO. 27991

Yoshimura, Shigetake

ROTARY ENGINE WITH SECONDARY AIR INJECTING MEANS TO OXIDIZE UNBURNED EXHAUST GAS.

(Toyo Kogyo Co., Ltd., Hiroshima (Japan)) U. S. Pat. 3,546,878. 7p., Dec. 15, 1970. 2 refs. (Appl. April 10, 1969, 8 claims).

A rotary piston internal combustion engine is described, which has an epitrochoidal casing with flat side walls and a rotary piston disposed therein which is triangular in shape and rotated in a planetary movement. An apex seal, a side seal, and a corner seal keep the contact areas airtight between the casing and the rotary piston. Also, an oil seal is carried by the rotary piston in such a manner as to prevent oil from leaking outwardly through the space between the side walls and the rotary piston. Suction and exhaust ports are provided at predetermined locations within the casing as is an ignition plug in a conventional manner. A plurality of nozzles are provided for injecting secondary air into the chamber formed between the rotating piston and the casing wall. Disposition of the nozzles is such that they open from the one disposed radially outermost with respect to the rotating piston during planetary movement. Thus, a highly satisfactorily secondary air supply is delivered into the operating chamber to oxidize and burn the unburned components of the exhausut gas.

10350 APTIC NO. 27992

Seliger, James J.

DEVICE FOR DECREASING FORMATION OF WASTE PRODUCTS OF COMBUSTION FROM ENGINES.

(Assignee not given.) U. S. Pat. 3,547,090. 4p., Dec. 15, 1970. 9 refs. (Appl. Sept. 24, 1968, 4 claims).

A device is described which increases the combustion efficiency of internal combustion engines and also draws unburned gases and fumes from the crankcase to the intake manifold so that they can be reburned, thus decreasing the amount of waste products from the exhaust pipe as well as from the engine breather pipe. An open-center insert, which has a hollow tube member extending diametrically across its open center, is installed in the fuel intake system between the fuel mixing device and the intake manifold. This tube member supports a baffle which serves to creat a vacuum, in turn creating a vortex agitating action of the fuel mixture for better combustion. One end of the tube is connected into the crankcase breather tube of the engine by a conduit and has an aperture on its bottom side whereby suction created at the bottom of the baffle by the vortex causes unburned gases and fumes from the crankcase to be drawn back into the intake manifold for reburning. (Author abstract)

10351 APTIC NO. 27993

Pierlot, Michel Eugene

CARBURATION DEVICE FOR INTERNAL COMBUSTION ENGINES FOR AUTOMOBILE VEHICLES.

(Societe Industrielle de Brenets et d'Etudes, Neuilly- Sur-Seine (France)) U. S. Pat. 3,547,089. 8p., Dec. 15, 1970. 10 refs. (Appl. April 3, 1968, 5 claims).

A carburetion device is described which comprises means for limiting pollution of the atmospheric air by exhaust gas, these means being adapted simultaneously to increase the flow rate of the air/fuel mixture and the increase the richness of this mixture, during periods of deceleration. In the case of a spark ignition engine, means are preferably provided for retarding the ignition during these periods of deceleration, without retarding the ignition during normal high speed operation. The carburetion device is characterized by the fact that the zone where the vacuum exists is situated downstream of the principal throttling member positions between idling and of minimum opening during deceleration, but upstream of this member for the other operating conditions. (Author abstract modified)

10352 APTIC NO. 27994

Muller, Oke W.

CENTRIFUGAL SEPARATOR.

(Assignee not given.) U. S. Pat. 3,546,854. 5p., Dec. 15, 1970. 7 refs. (Appl. Nov. 30, 1967, 2 claims).

A centrifugal device is described for separating entrained solid or liquid particles from a gaseous stream. A stationary baffle or tuyere is mounted within a cylindrical casing to impart an angular velocity to a gaseous stream passing through, so that in response to centrifugal force, the entrained particles are collected in an annular envelope adjacent the casing wall and thence removed from the separator. The baffle or tuyere defines a frusto-conical surface with its tapering and extending upstream and its base located adjacent the casing wall; the tapering end of the baffle or tuyere is closed to confine the gaseous stream to tangential slots defined by the tuyere. Thus, th present invention substantially reduces the vortex effect which may result due to the low-pressure zone that developes in the center or core of the whirling fluid mass. (Author abstract modified)

10353 APTIC NO. 27995

Hardison, Leslie C., Edward H. R. Pegg, Dom E. Reedy, and James M. Barr

GAS SCRUBBING APPARATUS.

(Universal Oil Co., Des Plaines, Ill.) U. S. Pat. 3,546,851. 4p., Dec. 15, 1970. 9 refs. (Appl. Dec. 20, 1968, 7 claims).

An improved and simplified form of gas scrubbing unit is described for particle laden gaseous streams. The unit provides for a two stage type of scrubbing operation by having liquid spray into the gas stream and effecting centrifugal flow mixing between the two streams while, in a second stage, having a high energy gas-liquid mixing provided by the gas flow being channeled through a plurality of slotted openings leading into the bottom of a diverging cone section. Although various combinations of gas stream wetting and liquid-particle separation have been tried, the known types of devices have not effected the present combination of wetting and scrubbing steps to provide a simplified form of two- stage scrubber unit.

10354 APTIC NO. 27999

Gladu, Norman D. and Gordon N. Gladu

FUMES BURNER.

(Assignee not given.) U. S. Pat. 3,547,592. 4p., Dec. 15, 1970. 6 refs. (Appl. May 31, 1967, 7 claims).

A fumes burner is described that is particularly useful as a combined muffler and afterburner for automobiles. This is because the burner is compact and generally flat, while providing a relatively long passage for the flow of gas. The burner includes two elongated conduit loops disposed in superposed nesting relationship. An inlet conduit is connected to one end of the firs loop and an outlet conduit to the opposite end of the second loop. A straight conduit connects the end of the first conduit loop opposite the inlet conduit and the end of the second conduit opposite the outlet conduit. The first conduit contains mixing and muffling baffles. Ignitors are mounted in the side of the straight connecting conduit to induce combustion of incompletely oxygenated components of the gas. The ignitors can be of the electric spark gas or gas flame types.

10355 APTIC NO. 28003

Engels, L. H. and J. Fahrbach

'EUROCONTAMINATION'. EUROPEAN SYMPOSIUM ON THE CLEAN ROOM TECHNIQUE.

('Eurocontamination'. Europaeishes Symposium ueber die Fertigung in Reinen Raeumen). Text in German. Staub-Reinhalt. Luft, 30(9):386-387, Sept. 1970.

A symposium on manufacture in clean rooms organized by the Eurocontamination Foundation was held in June 1970 in Stuttgart to discuss problems connected with the creation and operation of dust-free and of biologically uncontaminated rooms and with the adoption of a uniform terminology and technology. Clean room methods are used today in nuclear technology, in space technology and in the electronic, optical, chemical and pharmaceutical industries. In the two last named industries, biocontamination is of primary importance and the protection of the product places greater requirements on the purity of the environment than the protection of humans. Up to a year ago, the trend was towards clean areas; today it is towards smaller units because of high cost. The clean room technique entails the purification of the atmosphere by high-grade leakproof filters, the fast removal of residual particles or of particles generated by humans or by work and the control of the purity of the environment by appropriate devices. Nineteen scientific papers were read at the symposium, seven papers with industrial topics and the subsequent discussion dealt with eight topics. Some of the topics covered were Contamination control, Testing of high-grade aerosol filters, Problems presented by electrostatic electricity in fine mechanical manufacture, Clean rooms for the production of integrated circuits and others.

10356 APTIC NO. 28004

Fisher, Ervin, Ralph W. Russell, and Raymond A. Golembczyk

FILTER BAG CLAMPING APPARATUS.

(Fuller Co., Catasauqua, Pa.) U. S. Pat. 3,550,359. 5p., Dec. 29, 1970. 5 refs. (Appl. Nov. 29, 1968, 7 claims).

Filter bags have customarily been clamped to their supporting plates by clamping means situated solely inside the baghouse. The present invention provides a simpler and more efficient clampin arrangement that any known and eliminates the need to enter the baghouse to install, repair, or inspect filters. The filter bag of the invention includes an annular cloth flange at its open end. A rigid, annular ring is sewn into the flange and is of greater diameter than the bag receiving aperture of the support plate. A cage inside the bag includes an annular ring of smaller diameter than the bag receiving aperture of the support plate but lesser diameter than the annular ring member of the bag flange. The bag flange is pressed between the cage ring and the bag support by a screw down type of clamp secured to the support plate. This arrangement insures that the cage ring, bag flange, and support plate are sealed securely in relation to one another.

10357 APTIC NO. 28005

Araki, Takashi

DIRECTIONAL-CHANGE AIR CLEANING DEVICE.

(Komtasu Manufacturing Co., Ltd., Tokyo (Japan)) U. S. Pat. 3,552,102. 3p., Jan. 5, 1971. 5 refs. (Appl. Dec. 18, 1968, 3 claims).

An improved directional-change air cleaning device, in which performance is not affected by vibration is described for efficiently collecting dust. In cyclone dust separators, for example, the particles of dust are not always separated, deposited or removed, but follow the revolving air to perhaps the impingement filter, lowering its efficiency. Thus, a directional-change air cleaning device is provided, which comprises an annular plate extending between a frusto-conical and cylindrical wall. The dust inlet comprises a circumferentially segmental slope descending in accordance with the direction of revolution of the air and integrated with the flat annular plate at the head of the slope, a horizontal slit formed at the lowest end of the segmental slope, and a side wall formed between the slope and the flat annular plate whereby centrifuged and deposited dust is collected into the lower part through the dust inlet.

10358 APTIC NO. 28006

Owaki, Tooru

PROCESS FOR TREATING SULFUROUS ACID GAS-CONTAINING EXHAUST GAS.

(Furukawa Mining Co., Ltd., Tokyo (Japan)) U. S. Pat. 3,566,722. 4p., Jan. 19, 1971. 7 refs. (Appl. Sept. 21, 1967, 3 claims).

A process is described which comprises removing substantially all of the sulfurous and/or sulfuric acid gas components (sulfur dioxide and sulfur trioxide) from exhaust gas. The exhaust gas is treated with an aqueous solution of calcium hydroxide or calcium carbonate to thoroughly absorb the acid gases into the solution. Then, the obtained solution is reacted with sulfuric aci to produce plaster and evolve sulfurous acid gas, recovering the plaster and the acid gas.

10359 APTIC NO. 28007

Peterson, Leander J.

EXHAUST GAS CONDITIONING APPARATUS.

(Assignee not given.) U. S. Pat. 3,556,734. 3p., Jan. 19, 1971. 3 refs. (Appl. Feb. 5, 1968, 6 claims).

An automotive exhaust scrubber is described wherein the gases pass through a filter medium continuously wetted by a purifying liquid. Gas inlet and outlet conduits are connected to the housing at opposite ends and provide a generally horizontal path of gas flow. The liquid recirculates within the apparatus in response to flow of gas, and gases passing through the chamber are exposed to both the filter medium and the purifying liquid. This apparatus is particularly adapted for treating the exhaust gases which result from an internal combustion engine. The purifying liquid is selected to best control the gases to be treated. For automotive applications, a chlorinated hydrocarbon such as perchloroethylene is suggested. Granulated charcoal is the recommended filter medium. The device is physically similar to conventional automotive mufflers and the internal filter arrangement provides similar noise attenuation. A pitot-tube arrangement draws the liquid into the gas stream. A filler port is provided for fluid replacement.

10360 APTIC NO. 28008

Cochran, Thomas L.

AIR FILTER CONTROL ARRANGEMENT.

(American Air Filter Co., Inc., Louisville, Ky.) U. S. Pat. 3,552,098. 5p., Jan. 5, 1971. 6 refs. (Appl. July 12, 1968, 4 claims).

Timing mechanisms and instruments sensitive to changes in pressure differential across a filter are used to advance clean filter material into flow conduits. The former are insensitive to accumulation of dirt on a filter and impractical when the quantity of particulate matter carried by an air stream varies from time to time. The latter are intended to maintain the differential pressure within a very narrow range by introducing new media into the air filtering zone until there is a selected decrease in differential pressure indicating that the media has been replaced. Instruments sensitive enough to measure the slight decrease in pressure when new media rea introduced are extremely complex, expensive, and require a great deal of maintenance. The present invention provides a filter media indicator and a media advance control arrangement comprising a differential pressure indicator communicating with the air stream flowing through the conduit and sensitive to changes in differential pressure between the upstream and downstream side of the filter. Since the differential pressure indicator operates over a wide range of differential pressure, an extremely sensitive sensing means is not required. Air flow through the system is interrupted during filter media advance and the sensing devices are reset upon completion of the advance.

10361 APTIC NO. 28016

Cosby, William Trevor and Clive Richard Smith

PROMOTION OF CHEMICAL REACTIONS BY ELECTRICAL DISCHARGE.

(Holmes (W. C.), and Co., Ltd., Huddersfield (England)) Brit. Pat. 1,009,331. 3p., Nov. 10, 1965. (Appl. Nov. 12, 1960, 15 claims.)

The temperature levels required to produce activation energy for chemical reactions have been associated with wasteful energy output. To exlude any form of energy that serves no useful purpose in the chemical reaction, the present invention promotes the reaction by subjecting the reactant or reactants to a diffused electrical discharge produced by the application of high frequency, high voltage supply between a pair of electrodes separated by at least one dielectric screen. The supply is such that the diffuse discharge is greater than 7.2 watts/cu cm, as produced by a voltage of several KV and a frequency of several hundred Kc/sec. The dielectric screen, formed from quartz, ceramic, or mica, serves to diffuse the charge and prevent flashover. The diffuse electrical discharge has been successfully applied in the oxidation of sulfur dioxide to sulfur trioxide.

10362 APTIC NO. 28018

Brookman, R. S., J. F. Phillippi, and C. L. Maisch

SMALL-DIAMETER CYCLONES.

Chem. Eng. Progr., 59(11):66-69, Nov. 1963.

Increased particle collection efficiency can be obtained by using small diameter cyclones, which operate most effectively when arranged in parallel. These miniature cyclones range in size from 2 to 5 in. The air capacity in a standard cu ft miniature unit with a 4-in. water gauge pressure drop at 70 F could be 30 and 250, respectively. Fractional dust efficiency curves are presented for three different units and factors to be considered when designing or applying a parallel unit are described. The design factors noted pertain to the following areas: the common inlet manifold; the internal separating section of the individual cyclone; the common hopper; the outlet tube of each cyclone; and the common outlet manifold. Miniature cyclones are often used as a secondary unit to raise the over-all efficiency of a collection system based on large cyclones. They can also be employed in the field to determine the performance to be expected from a large collector.

10363 APTIC NO. 28021

Clark, W. E. and F. Kurata

FREEZING CO2 FROM NATURAL GAS.

Petrol. Refiner, 38(6):249-251, June 1959. 6 refs.

The freezing out of carbon dioxide from natural gas is discussed. Unless other constituents interfere, a simple solids-gas separator, such as a cyclone, can be used to remove the CO2. Temperature and pressure in the solids-gas separator are set by the natural gas purity desired. The greater the amount of CO2 in the field gas, the lower the temperature must be in order to freeze out the CO2, which places a limit of about 30 mole percent on the CO2 which can be handled. Heat balances are indicated, while refrigeration load is calculated with ammonia as the high temperature refrigerant and ethane as the low temperature refrigerant.

10364 APTIC NO. 28023

Wilson, Frank L.

EXPERIMENTS WITH THE THIOGEN PROCESS.

Mining Sci. Press, vol. 104:497-498, April 6, 1912.

In the Thiogen process for recovering sulfur from roaster, blast furnace, converter, and reverberatory furnace gases, the sulfur dioxide-containing gas is passed over a calcium sulfide catalyst in the presence of a reducing agent such as vaporized oil. As a catalyzer, the calcium sulfide acts as follows: 2CaS plus 3SO2 equals 2CaSO3 plus 3S. In the presence of the reducing agent, the CaSO3 is reduced to CaS according to the reaction: CaSO3 plus CH2 equals CO2 plus H2O plus CaS. Condensing chambers are necessary to collect the liberated sulfur. Although troubles were experienced in the experimental chamber described, preliminary results indicate an SO2 reduction of above 97%.

10365 APTIC NO. 28034

UNIQUE GAS CLEANING JOB TRAPS FLUORIDES AT TSP PLANT.

Air Eng., 4(3):46-48, 59, March 1962.

At the same time that design of a 600-ton per day triple superphosphate fertilizer plant was begun in 1956, an extensive program of air and stream sampling was initiated by the chemical firm. The program continued for five years, both to establish area pollution levels before plant operation, and to evaluate effectiveness of abatement procedures during operation. Once the monitoring program was set up, an on-the-spot tour of the sampling stations was arranged. In addition to comprehensive news releases and photographs, company personnel openly discussed the problems and the steps taken to solve them. Control measures include scrubbing, filtering, and various reactions to recover by-products. After three years of research, a solution to the problem of gaseous fluoride emission from the curing building was found. Instead of taking the pre-cured material from the settling belt and conveying it directly to the curing building, the product now drops from the settling belt into a chain mill, which breaks up the particles to a size of 1/2-in. or less. Control techniques at the chain mill and curing building are indicated, as well as the installation of electrostatic precipitators in the vicinity of the rock dust dryers. Precipitator operation is described.

10366 APTIC NO. 28044

Spaite, Paul W.

THE FEDERAL PROGRAM OF ENGINEERING RESEARCH AND DEVELOPMENT FOR SULFUR POLLUTION CONTROL.

American Inst. of Chemical Engineers, New York, American Inst. of Mining, Metallurgical and Petroleum Engineers (AIME), New York, N. Y., American Society of Civil Engineers, New York, American Society of Heating, Refrigerating and Air-Conditioning Engineers, New York, American Society of Mechanica Engineers, New York, and American Society for Testing and Materials New York, Engineering Foundation, Proc. MECAR Symp. New Development Air Pollution Control, New York, 1967, p. 63-69. (Oct. 23.)

A description is presented of the role of the Process Control Engineering Program of the National Center for Air Pollution Contro in organizing and managing engineering research and development programs to control sulfur oxide pollution. These programs are directed toward three goals: demonstration and large-scale protype studies of potential processes to control sulfur oxides from power generation; development of second-generation processes for removing SO2 from flue gases in the combustion of sulfur-containing fossil fuels; and a program to develop control methods for sulfur emission from sources other than combustion of fossil fuels. Protype developments encompass limestone or dolomite injection processes, alkalized alumina sorption, and processes for the 'deep cleaning' of pyritic sulfur from coal. Studies in new processes will survey the applicability of technology in nine areas to general SO2 emission control, the availability of low-sulfur coal, and the pollution problems of primary smelters, pulp and paper mills, sulfuric acid plants, and coke plants. Control of noncombustion sources will include problem definition systems studies and research of known problems. Research and development expenditures of the National Center for Air Pollution Control in 1967 and 1968 are itemized.

10367 APTIC NO. 28047

Fabuss, Bela M. and Wilson H. Dubois

CARBON ADSORPTION-ELECTRODESORPTION PROCESS.

Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 18p., 1970. 1 ref. (Presented at the Air Pollution Control Association, Annual Meeting 63rd, St. Louis, Mo., June 14-18, 1970, Paper 70-68.)

Benzene was adsorbed from an air stream saturated with benzene at 20 C, and sulfur was adsorbed from an air stream containing 1.2 to 1.3 volume percent sulfur dioxide. Desorption of the adsorbate fro the adsorbent was accomplished by passing an electric current directly through the electrically conductive adsorbent bed. Resistivity of the bed depends on the activated carbon used, its particle size, and packing characteristics of the bed. More than 80% of the benzene introduced into the adsorber was recovered in liquid form using a condenser cooled with tap water, while the electric power passed during desorption was 4 kWhr/cu ft carbon bed, heating the bed in about 5 minutes to 360 C. A unit recoverin one pound of organic vapor will have a bed volume of about 0.1 cu f and the electric power cost will be about 1.6 to 2.0 cents per pound liquid product. This organic vapor recovery technique would be generally applicable to hydrocarbons, solvents, and odorous materials. In the first experimental run, 64% of the adsorbed SO2 was removed when the temperature was increased in about 7 minutes to 450 C, and the subsequent desorption was carried out at about 500 C. Only 56% SO2 was removed in the next run when the heating was maintained at a level that gave a 300 C desorption temperature for about 15 minutes and then increased to about 420 C. Costs are also indicated for sulfur dioxide processing.

10368 APTIC NO. 28055

Anderson, Clarence A. and Mitchell D. Charneski

SMOKELESS-ODORLESS ELECTRIC INCINERATOR.

(Detroit Edison Co., Mich.) U. S. Pat. 3,548,762. 5p., Dec. 22, 1970. 2 refs. (Appl. July 11, 1969, 15 claims).

In order to ignite and promote combustion of refuse, a radiant heating structure is provided as part of a combustion chamber. The radiant heating structure comprises a plurality of parallel heating rods, such as coiled nickel chromium wire enclosed in ceramic alumina tubes. Remote from the combustion chamber and to the side of the heating elements, there is provided a reflecting wall formed of metal and backed by a relatively thick and highly efficient heat insulating material. A secondary heat radiating surface, preferably formed of metal and adapted to be brought to heat radiating temperature as a result of absorption, is intermediate between the heat radiating elements and the combustion chamber. These transversely curved walls in cooperation with the heat radiating elements cause the combustion products to move in turbulent flow through the restricted passageway, insuring a maximum of actual contact between the products of combustion and the hot surfaces of the passageway.

10369 APTIC NO. 28056

Yamazaki, Shuichi, Nobuyuki Togashi, Toshio Shioya, Tomoki Kikuraku, Norimitsu Kurihara, and Akira Ishizuya

AIR POLLUTION PREVENTIVE DEVICE FOR SPARK-IGNITION-TYPE INTERNAL COMBUSTION ENGINES.

(Honda Giken Kogyo Kabushiki Kaisha, Tokyo (Japan)) U. S. Pat. 3,566,064. 18p., Jan. 19, 1971. 5 refs. (Appl. April 1, 1969, 9 claims).

During the idling of internal combustion engines, the throttle valve is fully closed and the amount of air intake is reduced so as to cause incomplete fuel combustion, with the result that the engine exhaust tends to pollute the atmosphere. A similar result may occur when the throttle is rapidly closed during high speed operation. Thus, a device to prevent excessive reduction in the amount of air intake is described, which comprises a throttle valve actuating member connected to an actuator operable by increase in intake vacuum on the downstream side of a throttle valve. To prevent excessive power generation in the idling or decelerating mode, and to promote smooth idle an interconnected mechanism retards the ignition timing.

10370 APTIC NO. 28057

Koehler, Heinrich

HIGH-TEMPERATURE CORROSION ON A HEAT EXCHANGER.

(Hochtemperaturkorrosion an einem Waermetauscher). Text in German. Stahl Eisen, 91(5):275-281, March 1971. 1 ref.

Corrosion to a heat exchanger for recovering waste gases from a blast furnace is described. The gas for heating the exchanger has a heating value of 460 kcal/cu m, with the following composition: 13% carbon monoxide, 14% carbon dioxide, 57% nitrogen, 13% water, as well as 1% hydrogen, 1.3% oxygen, and 0.5% methane. Even after cleaning, the waste gas still has a high dust content of 1 g/cu m. Prior to combustion, the metals in the dust are sulfitic, while afterwards they are present as oxides and sulfates. Chemical analyses of the dust following combustion showed 5-20% iron to be present, 2-7% lead, 3-6% zinc, 1% arsenic, 0.3% copper, 10-15% silicon dioxide, 1% aluminum oxide, calcium oxide, and magnesium oxide. Approximately 16 kg dust per hour are carried through the plant by the flue gas. The heat exchanger is composed of tubes of ferritic chromium steel with 27% Cr, as well as chromium aluminum and silicon titanium steels. Metallographic and electron microscopic examinations did not indicate any clear causes for the corrosion, but is is assumed that the sigma phase was accompanied by a stronger intergranular attack. Additives composed of 78% magnesium oxide, 7% calcium oxide, 6% silicon dioxide, and 2% ferric oxide plus aluminum oxide helped to reduce corrosion.

10371 APTIC NO. 28059

BILL PROPOSED FOR THE LIMITATION OF THE LEAD CONTENT IN FUELS FOR OTTO ENGINES.

(Der Gesetzentwurf zur Begrenzung des Bleigehalts von Ottokraftstoffen). Text in German. Erdoel Kohle (Hamburg), 24(1):55-56, Jan. 1971. 14 refs.

A bill has been proposed which limits the lead content in fuels for Otto engines to 0.4 g/liter. It is to become effective in Jan. 1972, while a further reduction of the lead content to 0.15 g/liter is proposed for the beginning of 1976. However, the oil industry does not see itself able to meet this deadline, as new processes and new plants would be needed. The bill blocks any processes which would substitute other toxic substances for lead, and a fine is to be levied for disregard of the law.

10372 APTIC NO. 28060

Seidel, Guenther H.

MAINTENANCE OF CLEAN AIR. THE CONTRIBUTION BY THE MINERAL OIL INDUSTRY.

(Reinhaltung der Luft. Der Beitrag der Mineraloelwirtschaft). Text in German. Energie Tech., 23(1): 6-9, Jan. 1971. 1 ref.

The mineral oil industry is closely linked to the automobile industry, and any measure taken to curb exhaust emissions is reflected in the former. With the introduction of closed crankcase ventilation, the oil industry began production of oils with a five fold increase of alkalinity and which were better able to counteract cold sludge formation. The industry also had to produce new fuel additives for combating carburetor fouling. Presently, the oil industry is hard to work to produce lead-free fuels, but does not appear to be able to accomplish this without some drop in octane number. While the oil industry has succeeded in producing soot suppressing additives for diesel fuels, it has not avoided long term deposition on nozzles and in th combustion chamber. As a consequence, the combustion process is disturbed and more soot is produced than before.

10373 APTIC NO. 28061

Ochs, Hans-Joachim

PRECIPITATION OF OIL MISTS WITH ELECTROSTATIC PRECIPITATORS.

(Oelnebelabscheidung mit Elektro-Luftfiltern). Text in German. Energie Tech., 23(1):9-12, Jan. 1971.

An electrostatic precipitator designed for the control of oil mists described. The polluted air flow is cleaned in two successive zone of different potential. With tungsten wires as ionizing electrodes, the ionizing zone is supplied with a dc voltage of 6500 and 13,000 volts. The collecting plates are made of aluminum. Flow velocity for precipitation of oil mists should not be larger than 1 m/sec. A uniform distribution of air is required prior to entry into the electrostatic precipitator. Voltage fluctuations should be avoided. To retain dirt containing oil mists, a metal filter is inserted between the exhaust or and th precipitator. Since sparks might ignite the oil mists, carbon dioxide fire extinguishers should be installed in the vicinity of the filters. While the capital costs are high for such precipitators, the running costs are low. The efficiency of electrostatic precipitators for the rentention of oil mists is greater than that for mechanical collectors.

10374 APTIC NO. 28064

Knoblauch, Karl

DRY SO2 REMOVAL FROM DUST CONTAINING WASTE GASES.

(Trockene SO2-Abschaidung aus staubhaltigen Abgasen). Text in German. Umschau, 71(1):26, Jan. 1971.

Adsorption methods are suitable for the removal of sulfur dioxide from power plant waste gases. These gases carry approximately 0.1% SO2 per cu m of waste gas. The basic principle of the removal of SO2 consists of its adsorption on activated coke. Water vapor and oxygen in the gases are retained and simultaneously convert the SO2 to sulfuric acid, which slowly fills the pores of the activated coke. The latter is regenerated and used again. One method of regeneration involves the inert heating of the activated coke to above 600 C, while a second method utilizes water scrubbing at normal temperatures. For thermal regeneration, the activated coke is continuously entered into a reactor filled with hot sand. At the end of the reactor, the regenerated coke is mechanically separated from the sand, cooled and returned to the gas cleaning plant. A similar principle is used for regeneration by scrubbing.

10375 APTIC NO. 28067

DUST REMOVAL FROM CUPOLA WASTE GASES THROUGH A NEW WET CLEANING METHOD.

(Entstaubung von Kupolofenabgasen durch neues Nassreinigungsverfahren). Text in German. Technica, 20(3):206, 1971. (Also: Wasser Luft Betrieb, 15(2):80, 1971.)

A wet cleaning method for cupola waste gases is described, which operates according to the venturi principle following preliminary saturation. From two alternately operated cupola furnaces, two pipelines lead to the saturator. After the saturator the two pipelines are united, and they enter the venturi section as one pipe. The saturator consists of two flues, saturating and cooling the hot gases to the dew point. It is divided into two halves with a passageway at the bottom. The gas flows from above into the first half of the saturator, is deflected on the bottom, and leaves the saturator above but in the second half. When the furnace is not operating, the saturator is flooded with water. The venturi section is followed by a separator, a blower, and a stack for the cleaned gases. Waste gases can be cleaned with this method to a residual dust concentration of 0.892-0.025 kg/tons.

10376 APTIC NO. 28068

Rueb, Friedmund

DUST COLLECTION BESIDE THE GRINDING AND POLISHING OF METALLIC WORKPIECES.

(Entstaubung beim Schleifen und Polieren metallischer Werkstuecke). Text in German. Wasser Luft Betrieb, 15(1):21-24, Jan. 1971.

Dust control practice in the bearing industry are described. Dust produced through the grinding and polishing of metallic workpieces is immediately extracted, and the dust-laden air is cleaned in dry or wet dust collectors. If the dust concentration is not too high, dry dust collectors are used. Cyclones may be used as preliminary dust collectors, with cloth filters for fine cleaning. An envelope type of cloth filter is preferably used. Dry and wet dust collectors may also be used in combination. Grinding sections are often associated with dry collectors, while polishing sections have wet collectors assigned to them.

10377 APTIC NO. 28072

Boas, A. H. and R. C. Andrade

SIMULATE SULFUR RECOVERY PLANTS.

Hydrocarbon Process., 50(3): 81-84, March 1971. 14 refs.

The general concern for air pollution control has given impetus to the area of sulfur recovery from natural and refined gases. A computer program to quickly evaluate Claus-type sulfur plants is reported. The mathematical model may be used to simulate the effect on plant conversion of variations in feed composition catalytic converter operating temperatures, blower pressure, waste heat boiler temperature, condenser temperatures, furnace conversion, and entrainment. It may be used to simulate the effect on theoretical conversion of variations in the ratio of hydrogen sulfide/sulfur dioxide, to determine the reheating demands for the auxiliary burners, and to obtain an indication of catalyst efficiency. Only those species that may be present at equilibrium must be known along with their free energy functions at the reactio temperature. Results are reported for the application of the model to a Claus process that includes three partial condensation steps and two stages of catalytic reaction.

10378 APTIC NO. 28073

Parmegiani, Mario and Oreste Bellofatto

PROCESS FOR THE UTILIZATION OF THE EXHAUSTED GASES FROM AN ETHYLENE OXIDE SYNTHESIS REACTOR.

(Snam Progetti SpA, Milan (Italy) U. S. Pat. 3,552,122. 2p., Jan. 5, 1971. 5 refs. (Appl. Aug. 6, 1968, 1 claim).

In a related application, a process was described for recovering thermal and mechanical energy of the exhaust gases of the ethylene oxide synthesis process by means of combustion at a controlled temperature and pressure, and by transferring the high pressure and temperature gases into a turbine directly coupled with the compressor feeding the air of the process. An alternate procedure is described in which the exhaust gases containing ethylene are preheated in a heat exchanger, then expanded into a turbine coupled with compressors at low and high pressures, respectively, and finally burned in a boiler to produce steam to drive the turbine. Advantages of this process include the possibility to use any auxiliary fuel and the centralized production which results from combining together the overheated steam produced by other heat generators in the unit.

10379 APTIC NO. 28074

Ohno, Chotaro

DESULFURIZATION METHOD FOR STACK GAS BY ACTIVATED CARBON-- REGENERATION BY WASHING.

(Kasseitanbo haigasu datsuryu sochi-- suisen datchaku shiki). Text in Japanese. Nippon Kikai Gakki Shi (J. Japan Soc. Mech. Engr.) (Tokyo), 74(626):60-261, March 1971.

A new apparatus for desulfurizing power plant flue gases utilizes activated carbon, the adsorption of which is physical and rather low when sulfur dioxide is not accompanied by other gases but chemical and extremely high when oxygen and water are present in addition to SO2. Prior to desulfurization, the flue gases are passed through a multicyclone and electrostatic precipitator for the removal of dust. To provide a continuous process, five towers packed with the catalyst are placed in parallel arrangement; each tower undergoes a cycle of adsorption, washing, and drying. Dilute sulfuric acid and carbon black adsorbed by the activated carbon are removed completely by the water scrubbing at room temperature. The recovered sulfuric acid (65% concentration) is used for superphosphate fertilizer, gypsum, ammonium sulfate, and pickling agents. The washed catalyst contains 20-30% water, which is dried with part of the flue gas. Because this method of desulfurization is a dry process, the flue gas temperature can be kept above 100 C, which is favorable for atmospheric diffusion and the elimination of white smoke, droplets, or mist. A flow sheet is included of the 150,000 cu Nm/hr pilot plant where the process was tried.

10380 APTIC NO. 28075

Koening, L. Randall

NUMERICAL EXPERIMENTS PERTAINING TO WARM-FOG CLEARING.

Monthly Weather Rev., 99(3):227-241, March 1971. 9 refs.

The possibility of modifying warm fogs by seeding them with condensation nuclei was assessed. This was done by calculating the time-dependent changes in the sizes and concentrations of fog droplets that are predicted by the ordinary equations of diffusion of water vapor to and from the surface of droplets. Their size, molality, and ambient water vapor density were taken into account. Initial conditions consisted of a homogeneous volume of air of specified height and aerosol content; an external cooling rate and seed dosage were specified. The effects of various combinations of cloud height and seed properties (such as size, mass density, and rate of injection) on the metamorphosis of the fog droplet population were examined. Usually, the cloud-forming process (in which temperature decreases with time) was allowed to continue after the completion of seeding. The optimum size seeding material was concluded to be a function of fog thickness. Material smaller than about 4 millimicrons should be excluded, and particles 20-50 millimicrons in diameter are most suitable for seeding moderately thick (approximately 100 m) clouds. (Author abstract modified)

10381 **APTIC NO. 28080**

Betz, B. de

THE ACTIVITIES OF ELECTRICITE DE FRANCE IN ATMOSPHERIC POLLUTION CONTROL.

(L'action d'electricite de France en matiere de prevention et de surveillance de la pollution atmospherique). Text in French. Ann. Mines (Paris), no. 11:31-44, Nov. 1970.

Thermonuclear plants are compared with conventional thermoelectric plants with respect to the following problems: nature and origin of air-polluting emissions, air pollution control measures, methods of surveillance in the vicinity of plants. A modern conventional power plant emits 0.01% carbon monoxide or less. The following figures are given for sulfur dioxide emissions: 0.5-1.0% for coal, 2-3% for standard fuel oil, 0.4-0.7% for low-sulfur fuel oil, and 0.0002% for purified natural gas. There are three approaches to pollution control: reduction of the quantity of pollutants emitted, neutralization of the harmful effects of certain pollutants, improvement of the dispersion of pollutants emitted int the atmosphere. A major problem of coal burning plants is the elimination of dust, a popular control device being the electrostatic precipitator. Sulfur dioxide emissions from oil burning plants can be reduced by at least a partial desulfurization of fuel oil in the refining stage, by treatment of waste gas to remove sulfur compounds, and temporary use of low-sulfur fuel oils. Two methods given for neutralizing emissions are the injection of ammonia gas (eliminates sulfur trioxide) and the injection of finely powdered dolomite at the rate of 0.5 kg per ton of fuel oil burned (reduces the acidity of the emissions). Dispersion in the atmosphere is controlled by several parameters: chimney height, amount of gas emitted, speed and temperature of the gas as it leaves the chimney, wind velocity, vertical temperature gradient, local atmospheric turbulence, the latter being strongly influenced by topography. The actual height attained by the smoke plume is represented by the sum of the geometric height of the chimney plus additional elevation gained by the speed and the temperature of the escaping gases. The following chimney heights are recommended: 110-125 meters for 125 MW output, up to 160 meter for 250 MW, up to 240 meters for 600 MW. This assumes an escape velocity of 12-20 meters per second and a temperature of 110-130 C for the gases leaving the chimney. A brief summary is given of current studies being made on the desulfurization of fuel oil and the elimination of sulfur products from exhaust gases. There i also a brief summary of the type of radioactive pollutants emitted by nuclear plants, and means of control and surveillance of such pollutants.

10382 **APTIC NO. 28083**

Little, Donald M. and George R. Hettick

REMOVAL OF SULFUR DIOXIDE AND CARBON DIOXIDE FROM STACK GASES.

(Phillips Petroleum Co., Bartlesville, Okla.) U. S. Pat. 3,553,936. 5p., Jan. 12, 1971. 6 refs. (Appl. April 22, 1968, 7 claims).

A method is described for removing sulfur dioxide and carbon dioxide from stack gases. If not already cooled, approximately 140 gallons of water per minute will be introduced to quench the gases to about 150 F. The quenched gases are passed to a water knock-out drum, a fan or blower, and then to the sulfolane absorption tower, to which approximately 35,600 gallons/minute of liquid sulfolane are passed at about 148 F. The SO2-rich sulfolane stream which also contains CO2 is heated to recover lean sulfolane bottoms which can be recycled, a side stream of SO2, and an overhead stream containing the CO2. For best operation, the cooled gases are compressed to a pressure of about 1 psig prior to the absorption step.

10383 **APTIC NO. 28084**

Ueda, Akiyoshi

WET TYPE GAS SCRUBBER.

(Nippon Steel Corp., Tokyo (Japan)) U. S. Pat. 3,556,489. 8p., Jan. 19, 1971. 10 refs. (Appl. Aug. 14, 1967, 6 claims).

In present venturi-type scrubbers, the controlling equipment for varying the cross-sectional area is provided in the throat part of the scrubber so that the flow rate of the gas passing through the throat may be varied. However, unnecessary vortex and separation of boundary layer will be produced in the gas flow after the throat part, while recovery of the pressure loss will be entirely lost. An invention is described in which a variable cross-sectional area mechanism is inserted in the throat of a gas scrubber so that the cross-sectional area of the gas passage can be varied in response to the varying gas flow rate. Guide plates are provided on the upstream and downstream sides of the variable cross-sectional mechanism so as to divide the gas path in two. Thus, a conversion from a static pressure of gas to a dynamic pressure in the throat part of the scrubber, and a conversion from the dynamic to the static pressure in the pressure recovering part, can be performed effectively to reduce the pressure loss of the entire equipment. By properly selecting the form of the curve made on the outer periphery of the part of the variable bulkhead plate in contact with the gas, the relationship between the gas flow rate and the control variable of the cross-sectional area mechanism can be linearized in a wide range.

10384 **APTIC NO. 28085**

Bockman, Ole K.

GAS-LIQUID CONTACT APPARATUS AND METHOD.

(Aktiebolaget Svenska Flaktfabriken, Stockholm (Sweden)) U. S. Pat. 3,556,490. 4p., Jan. 19, 1971. 6 refs. (Appl. May 5, 1969, 10 claims).

A wet scrubber for effecting liquid-gas contact is described, in which the gas is passed through a bed of suspended loose contact material which is wetted by a liquid. The wetting liquid is injected in the form of a compact jet directed upward along the central axis of the scrubber so as to impart to the contact material a controlled circulatory motion in the contact zone. In conventional apparatus, the liquid is distributed uniformly across the entire cross section of the contact zone, with the result that the relation between gas and liquid will be unfavorable in sections with a high gas speed. (Author abstract modified)

10385 **APTIC NO. 28086**

Ortgies, Raymond C.

GAS SCRUBBING APPARATUS.

(American Air Filter Co., Inc., Louisville, Ky.) U. S. Pat. 3,552,727. 4p., Jan. 5, 1971. 4 refs. (Appl. Sept. 18, 1968, 6 claims).

In various facilities in the metallurgical and other industries, numerous arrangements have been utilized at the open end of dirty gas discharging stacks to rid the dust and fly ash from these gases and to suppress sparks. Many of these arrangements have required extensive auxiliary equipment and duct work, have bee expensive in construction and maintenance, have occupied considerable space, and have been relatively ineffective in proper gas distribution and in securing efficient removal of entrained particles from the stack gases. An improved gas scrubbing apparatus is described which comprises a housing about an open stack end, a passageway with a plurality of pairs of oppositely inclined baffle members, and the scrubbing liquid which is introduced along the inclined surfaces of the baffle members.

10386 APTIC NO. 28087

Bowers, Norman Kenneth

APPARATUS FOR SEPARATING LIQUID DROPLETS FROM A GAS OR VAPOR.

(Appareil pour separer des gouttelettes liquides d'un gaz ou d'une vapeur). Text in French. (English Electric Co., Ltd., London (England)) Swiss Pat. 495 767, 4p., Oct. 30, 1970. (Appl. Dec. 17, 1969, 6 claims).

A conventional device for separating liquid droplets from a gas or vapor causes the gas to move upward through a horizontal screen, where the liquid droplets coalesce, their accumulated weight causing them to be more highly subject to the force of gravity, so that they fall backward from the screen, while the gas or vapor moves upward through the screen and escapes. The invention is aimed at improving this type of device, one limitation of which is that the speed with which the gas is fed into the device is severely limited. The improvement consists in making the chamber in which the screen is located into a revolving drum, arranged in such a way that the rotation creates centrifugal force, which acts in conjunction with the force of gravity in separating the accumulated droplets from the gas, thus permitting the gas to be fed more rapidly into the device.

10387 APTIC NO. 28089

Yokohama City Health Bureau (Japan)

AIR POLLUTION IN YOKOHAMA--ITS PRESENT SITUATION AND COUNTERMEASURES.

(Yokohama no taiki osen--sono genjo to taisaku). Text in Japanese. Health Hama Rept. 33, Pollution Series 11, 4p., March 1970.

Although visual pollution such as smog has been people's idea of pollution, it is the nonvisual pollutants which are causing damage to men and materials. In an effort to adopt a scientific attitude to the nonvisual pollutants, environmental standards have been set up for sulfur oxides and carbon monoxide. Dust and sulfur oxides have been measured in Yokohama for about 10 years. Dust has now decreased and, although sulfur oxides increased up to 1967, they have decreased somewhat in 1968 and 1969. Sulfur oxides are presently determined at 6 places and the results telemetered to a pollution center. During 1969, concentrations exceeded the environmental standard at three locations. Statistics from 1968 indicate that Tokyo, Kawasaki, Fuji, Osaka, Sakai, and Yokkaichi exceeded the degree of pollution in Yokohama, while Kobe and Kitakyushu had about the same degree of pollution. In Yokohama, a situation exists whereby no new enterprises will be approved unless they go along with site and facility conditions based on scientific data. However, pollution is still very high due to existing facilities. Joint research is being carried out with Kawasaki City and Tokyo, and recommendations have been made for pollution control. It is hoped that with advanced desulfurization technology, the generation of sulfuric acid gas will be curbed, while efforts are being made to secure heavy oil with a low sulfur content and liquefied natural gas. In the future, there will also be more atomic energy power generation.

10388 APTIC NO. 28090

Koepfer, Edward

DUST EXHAUSTION DEVICE.

(Staubabsaugevorrichtung). Text in German. (Assignee not given.) Swiss Pat. 495,792. 3p., Oct. 30, 1970. (Appl. Nov. 6, 1969, 7 claims).

When powdered materials are being filled into open receptacles through a feeder pipe, part of the material is whirled up, floats in the air as dust and eventually settles in the surrounding area. Depending on the type of material, the dust sediments may create a fire hazard, and/or a health hazard in case of toxic material. The present invention relates to a device for keeping the vessel covered during filling and for directly exhausting the dust suspended in the air at the top of the vessel and in the feeding pipe. The typical design provides for a steel cover with a sponge rubber seal at its underside and a central nozzle on top. Attached to the nozzle is a vertical filling pipe of the bellows type whose upper end connects to a stationary filling funnel. A second nozzle of smaller size, located off center, serves as air outlet connection. It carries an air filter and, in case of handling of toxic material, can be connected to a vacuum chamber via a flexible hose. Integral with the cover and adjoining its edge over an angle of 165 degrees, a curved suction manifold is provided which extends downward and during filling, embraces the outer cylindrical surface of the vessel. The manifold has perforated slots in its inner wall and carries a tubular exhaust nozzle at its outside, attached to which is a flexible hose that leads to the vacuum generating and dust collecting station. Two double acting cylinders, mounted below the funnel, provide the means for lifting and lowering the cover assembly. In operation, the cover sits on the vessel during filling, with the deplaced air escaping via the smaller nozzle. Upon completion of filling, the cover assembly including filling pipe is first lifted partially only, to expose the intake slots of the suction manifold for the exhaust action. Stop of evacuation, complete lifting, removal of filled vessel, introduction of next empty vessel, and lowering of cover assembly complete the operational cycle.

10389 APTIC NO. 28091

Schmid, Otto

DEVICE FOR PURIFYING GASES.

(Vorrichtung zum Reinigen von Gasen). Text in German. (Acromix Etablissement, Vaduz (Liechtenstein)). Swiss Pat. 495,768. 5p., Oct. 30, 1970. (Appl. June 12, 1968, 10 claims).

A device is reported for purifying gases, particularly air, by removing solid and/or liquid suspended particles as well as soluble gases and vapors. A washing fluid, such as water, contained in the lower part of a cylindrical vessel is atomized inside the vessel, above the fluid reservoir. The principle of the process is to force the gas or air to be purified through a veil of atomized washing fluid, effecting the formation of fine droplets in which the particles are enveloped. By subsequently imparting a centrifugal motion, the mixture of gas and droplets is driven toward the inner cylindrical surface of the vessel where separation of the fluid particles is effected by impingement. A liquid film is formed which then flows down the wall and back into the fluid reservoir. The purified dry gas or air leaves through the top of the vessel. The principal components and construction features of the device are the cylindrical vessel, usually of vertical design, into which the gas or air enters tangentially just above the level of the fluid reservoir. The atomizer has the form of a spray wheel and receives its fluid supply from the reservoir via a circulating motor driven pump.

Mounted coaxially and in tandem with the spray wheel is an impeller for generating the centrifugal motion of the mixture toward the cylinder wall. Spray wheel and impeller are usually driven by a common motor. A suction fan mounted at the top of the vessel ahead of the gas outlet connection causes the forced movement of the gas or air through the vessel. A drain cork near the bottom of the fluid reservoir permit periodic removal of sludge. As one of the advantages of this pantented device over known designs is compact arrangement, not requiring additional separate units such as drip separator or filtering device.

10390 APTIC NO. 28092

Petru, Kamil

HYGIENIC ASPECTS OF THE INCINERATION OF POLYVINYL CHLORIDE REFUSE.

(Hygienicke Aspekty Spalovania Polyvinylchloridoveho odpadu). Text in Slovak. Plast. Hmoty Kauc., 8(1):8-9, Jan. 1971. 10 refs.

Aspects of disposing of polyvinyl chloride refuse by incineration are reviewed. In Czechoslovakia it was, until recently, customary for individual plants which process PVC to deliver their scrap to central collecting stations for sorting and reprocessing. However for reasons of quality, contaminated condition or economics, some refuse had to be retained and was burnt in the factories in simple incinerators using solid fuel. As in other highly industrialized countries, it will be necessary to change the method of incineratin PVC, mainly by way of burning it together with other types of refuse, for instance other plastic materials, such as polyolefins and polystyrene, and by providing ample supply of combustion air, resulting in a less harmful composition of flue gases from the point of view of air pollution. The largest toxic constituent in the flue gas arising from incineration of PVC is hydrochloric acid. HCl is known to be corrosive, and to be damaging to the human organism, to flora and to fauna. Inhaling of air with an HCl concentration of 1000 ppm will cause the death of a human being within a short time. In the U.S.A., Canada and Great Britain the maximum permissible HCl concentration in flue gases is 280 ppm which corresponds to a condition where in a mixture to be incinerated the PVC part does not exceed 0.54 percent. This drastically indicates the degree of air pollution to be expected from incineration of PVC alone, not mixed with any other refuse.

10391 APTIC NO. 28098

Storch, Otakar and K. Pojar

THE PROBLEM OF WEAR OF CENTRIFUGAL SEPARATORS.

(Die Problematik des Verschleisses von Fliehkraftabscheidern). Text in German. Staub, Reinhaltung Luft, 30(12):501-506, Dec. 1970.

The life of cyclones is decisively influenced by abrasion. In order to determine the relationship between operating characteristics of a cyclone given by its construction and abrasion a number of cyclones of different types were tested with two different types of dusts under various conditions. The dusts used were the highly abrasive corundum and normal fly ash. The cyclones were fed with a gas concentration of 20 g/cu m corundum under pressure from 50 to 250 kp/sq m and the degree of abrasion of the 1 mm thick steel sheets used in the construction of the cyclones was measured following their dismantling. The four types of cyclones used in the tests included a normal cyclone with good separation efficiency, a cyclone with low work pressure difference and correspondingly poorer separation efficiency, a cyclone with a high pressure loss and high efficiency and a cyclone with a downwar sloping inlet and a long cone. Characteristic for all four types of cyclones was the uneven wear. Wear through eorision is primarily a function of the speed and direction of the moving particles, of their quantity, and of the time of exposure of the metal surface to the erosive effect. The degree of abrasion for a given type of dust depended not only on the feed velocity but als on a number of other factors specific for each particular type of cyclone; dependable information about the life of a particular type of cyclone under certain operating conditions could be obtained only experimentally.

10392 APTIC NO. 28100

Iinoya, Koichi

THE FUNDAMENTAL ASPECTS OF FILTER TYPE DUST COLLECTION (II).

(Rojin shujin no kiso chishiki II). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 7(2):129-133, Feb. 1971. 4 refs.

Dust collection from smelter fumes has been accomplished by bag filters. While high temperature fumes need cooling for the collection of submicron particles by filter cloths, this cooling ma cause condensation of certain subtances within the gas, particle adhesion, metal deterioration, and obstruction to the filter mesh. Charged particles also cause obstruction. An example of use of the bag filter is provided for handling waste from a heavy oil furnace. Gas flow is 400 cu Nm/min, particulate density is 4 g/cu m, and gas temperature is 350 C. Tetron filter cloth is utilized for six chambers, each having 144 bags mechanically vibrated at the top. At the inlet port of the filter the gas temperature is controlled to 140 C. Total pressure loss is 400 mm H2O. Breakage of the bags during the winter by sulfur dioxide mist is prevented by keeping the bag house warm with a 5 cm increase of wall thickness. Another example of bag filter application involves a gas flow of 10,000 cu Nm/min, a particulate concentration of 0.5 g/cu Nm, and a temperature less than 110 C. Results of a questionnaire concerning bag filter application in the United States indicate tha users are not interested in collection efficiency or filter cloth characteristics, but in operational problems for which causes may be found, such as obstruction. The influence of relative humidity and pressure loss on collection efficiency is mentioned.

10393 APTIC NO. 28108

Rayzacher, B.

PETROLEUM REFINING AND UTILISATION: EFFECTS ON THE ENVIRONMENT.

(Le reffinage et l'utilisation du petrole et l'environnement). Tex in French. Ann. Mines, (Paris), no. 11:45-54. Nov. 1970. 11 refs.

The energy consumption of Western Europe in 1965 amounted to 7.9 trillion kcal. It is estimated that this figure reached 9.4 trillion in 1970 and will be 15 trillion in 1980. In recent decades, petroleum has been replacing coal as a source of power. In 1965, 45.3% of the power used came from coal, and 42.4% from petroleum products. By 1980, it is predicted that petroleum will be the source of 58.8% of the power, and coal only 13.7%. During the same period of time, nuclear power is expected to increase from 0.7% to 10.4%, the latter figure corresponding to an output of 100,000 MW from nuclear generators in 1980. Figures are given of the number of petroleum refineries in Italy, West Germany, France, Great Britain, the Netherlands, and Belgium, together with their total production capacities. The average capacity of the European refinery is 3.73 million tons per year, slightly above that of the United States. The Pernis refinery in the Netherlands, the largest in the world, produces 25 million tons per year. A study of pollution due to escaping odors, in which half the European refineries participated, found that about 85% or more of such odors escaping from storage tanks could be eliminated by proper maintenance of pipe connections. The distillation units are an important source of odors, a condition that can be corrected by installing condensers in new plants, while in existing plants the situation can be improved by the installation of screens and by the extracting and burning of gases that cannot be condensed. A number of industries have sought a solution to sulfur dioxide pollution by building high smokestacks, 150 meters or more in height. One recently installed European plant built a chimney 213 meters high, costing 4.6 million dollars, which receives the combustion fumes from 24 furnaces and 14 boiler plants. Proper adjustment of carburetor and ignition by individual automobile owners would reduce air pollution from automobile exhaust by as much as 50%. The estimated cost of a new antiknock additive to replace tetraethyl lead in gasoline is 2.1 cents. It has been estimated that Africa alone contains sufficient low-sulfur petroleum sources to meet all the needs of European consumption.

10394 APTIC NO. 28109

Epelman, Jacobo

MUFFLER ADAPTED TO PURIFY THE EXHAUST GASES OF INTERNAL COMBUSTION ENGINES.

(Assignee not given.) U. S. Pat. 3,556,735. 4p., Jan. 19, 1971. 12 refs. (Appl. June 23, 1967, 1 claim).

A muffler which silences and purifies exhaust gases is described. It comprises a tubular elongated shell having straight edges, inlet and outlet openings compressed against one another and against the end faces of the shell by means of bolts and nuts, and covers for the open ends. Perforated partitions are distributed along and inside of the shell, while porous packings provided between the partitions very effectively retain dust, soot, and other solid impurities. The interior of the muffler provides ample space wherein the exhaust gases may collect and lose their speed, while the back pressure built up by the various partitions may be made relatively low; thus, the exhaust gases exit from the muffler in a smooth and steady flow to produce a very effective silencing effect. Oxidation catalysts are provided in special chambers within the muffler to destroy carbon monoxide. The muffler is adapted to be assembled and easily dismantled for cleaning without removing the outer shell.

10395 APTIC NO. 28110

Fuller, William R., Barrie H. Bieler, and David C. Morgan

METHOD OF REDUCING HALOGEN EMISSIONS FROM THE INCINERATION OF HALOGEN-CONTAINING PLASTICS.

(Dow Chemical Co., Midland, Mich.) U. S. Pat. 3,556,024. 3p., Jan. 19, 1971. 3 refs. (Appl. June 27, 1969, 7 claims).

A method is provided for reducing the emissions of halogen as a combustion product in the incineration of halogen-containing plastics. Attempts have been made to reduce the amount of halogen emission by passing the combustion gases of the halogen-containing plastic through screens loaded with solid sodium carbonate. While these attempts have met with some success, such a method requires modification of the incinerator by the addition of special screens. The screens must be relieved of the sodium halide, which is the product of the reaction between the halogen and sodium carbonate, and reloaded with sodium carbonate periodically. The present method involves applying an alkali to the material to be incinerated. Preferred alkalis include hydroxides, oxides, carbonates, and carboxylates such as acetates of the alkali metals and alkaline earth metals. Due to its high solubility in water and low cost, sodium hydroxide is the preferred species of alkali. The most efficient retention of the halogen is achieved when the mole ratio of alkali to halogen is from about 0.4:1 to 1:1. The alkali is normally applied by spraying it as a water solution on the waste to be incinerated.

10396 APTIC NO. 28111

Liebermann, Leonard N. and Stanley H. Lai

METHOD AND APPARATUS FOR DETECTING GASEOUS IMPURITIES IN ACCORDANCE WITH CHANGES IN SPARK BREAKDOWN POTENTIAL CAUSED THEREBY.

(Assignee not given.) U. S. Pat. 3,559,049. 12p., Jan. 26, 1971. 6 refs. (Appl. July 2, 1968, 15 claims).

A method and apparatus are provided for detecting the presence in a given atmosphere of gaseous impurities having dielectric breakdown potentials different from that of the given atmosphere. This invention is particularly useful for detecting leaks of refrigerant compounds from refrigeration equipment or other machinery utilizing halogen compounds for heat transfer or absorption. Other methods utilize cumbersome equipment, detectors which may suffer from deterioration of contamination, hazardous hig temperature arcs, or quite insensitive chemically produced flames. Thus, apparatus is provided for periodically applying voltage pulses across one or more pairs of electrodes disposed in the given atmosphere, the amplitudes of the voltage pulses being sufficiently greater than the dielectric breakdown potential of the given atmosphere to cause spark breakdown to occur in the presence of substantially all concentrations of such gaseous impurities to be detected. The discharge current flowing between the electrodes is limited to a low intensity spark discharge. During the initial portion of the low intensity spark discharge resulting from each voltage pulse applied across the electrodes, the electrode voltage is at a maximum and is equal to the dielectric breakdown potential of the atmosphere under test. A detector is provided for detecting changes in the maximum electrode voltage from its value in the absence of impurities, the changes indicating the presence of impurities.

10397 APTIC NO. 28112

Kuo, Wen Ling and John R. Anderson

GAS PURIFICATION PROCESS.

(Union Carbide Corp., New York, N. Y.) U. S. Pat. 3,554,691. 7p., Jan. 12, 1971. 5 refs. (Appl. June 11, 1968, 22 claims).

A process is described for purifying natural and synthesis gases containing acid gases. It comprises contacting the gases with an alkanolamine solution, separating and recovering a gas stream substantially free of the acid gases, and regenerating gas rich absorbents into a lean basic solution and a weak acid solution. The rich alkanolamine solution is regenerated by an electrodialytic procedure. Monaethanolamine and diethanolamine are recommended as absorbers. The principal shortcoming of present methods is in regeneration of the absorbent.

10398 APTIC NO. 28113

Stookey, Kenneth W.

FURNACE EMISSION CONTROL SYSTEM.

(Torrax Systems, Inc., North Tonawanda, N. Y.) U. S. Pat. 3,557,725. 5p., Jan. 26, 1971. 3 refs. (Appl. July 10, 1969, 15 claims).

A furnace emission control system is described, which pertains to a vertical furnace charged at the top and having a heated well at the bottom in which hot gases are drawn off and supplied to an igniter for secondary combustion. The gases discharged from the igniter are passed through a waste heat boiler, then through an induced draft fan, and through a bag filter, or precipitator to the atmosphere. Gas flow throughout the system is maintained so that the furnace above the gas outlet is at subatmospheric temperature, with the gas flowing into the igniter. The oxygen content of the gases discharged from the waste heat boiler is determined, and secondary air is admitted to the igniter if needed. The temperatur of the gases from the igniter is measured, and supplementary fuel may be supplied to maintain the minimum safe operating temperature. Controls are provided to bypass gases above a predetermined temperature away from the bag filter and to maintain the igniter temperature above a predetermined minimum. (Author abstract)

10399 APTIC NO. 28114

Sharpe, Patrick H.

SMOKE AND GAS CLEANING APPARATUS.

(Brule C. E. and E., Inc., Blue Island, Ill.) U. S. Pat. 3,553,943. 4p., Jan. 12, 1971. 11 refs. (Appl. Nov. 6, 1968, 7 claims).

An apparatus is described which comprises a chamber with partitions forming compartments, some of which are provided with spray nozzles and a liquid bath whereby smoke is sprayed with water and passed through the liquid bath. The apparatus may be lined with refractory materials to permit high temperature operation and provide resistance to chemical attack. Combustion effluent and noxious gases are passed at different velocities through the water sprays and a water trap with multiple changes of direction.

10400 APTIC NO. 28115

Willett, Howard P.

ADJUSTABLE ANNULAR VENTURI SCRUBBER.

(Chemical Construction Corp., New York) U. S. Pat. 3,544,086. 8p., Dec. 1, 1970. 17 refs. (Appl. Aug. 19, 1968, 29 claims).

Increasingly stringent air pollution regulations require adequate facilities to remove contaminants entrained in stack gases. Installation of conventional devices such as bag filters is not warranted economically, and most wet scrubbers fail to compensate for variations in gas flow rate. An annular throat venturi scrubber is described that can be modified or adjusted to accommodate variations in gas flow rate, or to permit greater pressure drop and more effective scrubbing at substantially constan gas flow. The adjustment is made possible by a vertically movable conical baffle that defines, together with an inverted frustoconical baffle, the venturi passage. The apex of the conical baffle extends upwards and opposed to gas flow. Scrubbing liquid is passed down over the outer surface of the conical baffle and the inner surface of the frustoconical baffle, and the two scrubbing streams are projected into the gas stream at or adjacent to the venturi passage. The elevation of the conical baffle relative to the frustoconical baffle is controlled by means of a central shaft extending downward from the apex of the conical baffle.

10401 APTIC NO. 28117

Zin'kovskii, M.

THE STRUGGLE AGAINST DUST AT THE FERROUS METALLURGY ENTERPRISES.

Metallurgist USSR (English translation from Russian of: Metallurg.), no 2:75-76, Feb. 1969.

For many technological operations in ferrous metallurgy, no technical solutions have yet been found for preventing the release of dust. An immediate task is the development of a mathematical description of the aerodynamical processes of propagation of dust from point and linear sources for different air currents. The adopted systems of dust elimination, aspiration, and ventilation and the apparatus used require thorough mathematical investigations. The time has also come for the development of a single organization framework for the dust ventilation services for metallurgical enterprises, and the organization of planned training of cadres for them by a system of technical training at the works.

10402 APTIC NO. 28118

Kranig, Lothar E.

THE EXPANSION OF THE CALTEX REFINERY AT RAUNHEIM.

(Der Ausbau der Caltex-Raffinerie in Raunheim). Text in German. Erdoel Kohle (Hamburg), 23(12):793-798, Dec. 1970.

The recently (1970) completed plant capacity expansion of the Caltex refinery at Raunheim included the erection of a second distillation plant for crude oil for 240 cu m/h Lybian oil, a steam cracking plant for the production of 250,000 tons of ethylene per year, a plant for the purification of propylene which is subsequently processed in Hoechst to poly propylene, three 100 t/hour boilers, a water cooling system, and the necessary storage tanks. To cope with the increased waste water output, special canal systems were built for oil free and oil contaminated waste water. A second complete oil water processing plant was erected including an oil separator (API), a rain water storage tank, a flocculator, and a two-step biological purification plant (Lurgi). The flocculator uses iron sulfate as a flocculating substance. The API separator is enclosed which minimizes the emission of offensive smelly substances. An acid stripper takes care of the removal of hydrogen sulfide, ammonia, and other offensive substances from the waste waters. Air pollution is minimized by the erection of a 135 m high stack and by the use of low sulfur heating oil. A sulfur dioxide monitoring device continuously measures SO2 emission by the stack. The emission through evaporation of offensive hydrocarbon compounds is minimized by thermal oxidizers and by storage tanks with floating roofs.

10403 APTIC NO. 28121

Spurny Kvetoslav

MEASURING THE EFFECTIVENESS OF HIGH EFFICIENCY FILTERS.

(Zur Frage der Messung des Wirkungsgrades bei hochwirksamen Filtern). Text in German. Staub, Reinhaltung Luft, 30(12): 529-533, Dec. 1970. 37 refs.

No standard testing method is hitherto available for high efficiency filters including all fiber filters whose permeability does not exceed 0.0005%. Exploration of the possibilities of applying modern particle counters including the Royco particle counter, the Bausch and Lomb counter, the Sartorius scintillation counter, the General Electric counter for condensation nuclei, the Sartorius aerosol photometer, the KOL aerosol photometer (Russian), and the Pollak-Nolan counter to the measurement of the effectiveness of filters revealed that there are specific and limiting conditions for filter control by means of these instruments which must be taken into account. The particl concentrations before the filter must be smaller than 100000/cu cm. Under these conditions, filter penetrations greater than 0.001% can be measured. For filters smaller than 0.001%, no suitable measuring method exists. Several chemical analytical methods exist for the determination of quantities below 0.01 micrograms. What is missing for the widespread use of these methods for the testing of filters is a description of suitable model aerosols. Radioactive labelling of the substance constitutin the aerosol (Au, Ag, Se, Te, Pt oxide, and Re202) offers promising possibilities for the testing of filters.

10404 APTIC NO. 28122

Kovach, J. Louis and David G. Hannan

COMBINED SEPARATION OF DUSTS, OF AEROSOLS AND OF VAPORS IN PACKED ACTIVATED CARBON BEDS.

(Kombinierte Abscheidung von Staeuben, Aerosolen und Daempfen in gepackten Aktivkohle-Betten). Text in German. Staub, Reinhaltung Luft, 30(12):526-528, Dec. 1970. 9 refs.

The retention efficiency of deep activated carbon beds (15 inches) of a combination of dusts, aerosols, and gases warrants their industrial application; their filtering characteristics resemble those of fiber filters. Activated carbon saturated with either fly ash or with DOP aerosol did not manifest a decrease in its adsorptive power for iodine vapor. The filtering effectiveness of finer carbon granules (12 by 30 mesh) was higher than that of coarser granules (4 by 6 mesh), both for particles and gases, even though coarser granules seemed to be more advantageous both because of the reduced pressure gradient and the lesser danger of heat storing. The form of the aerosol retention curve demonstrates that different retention mechanisms are at work at different carrier gas velocities. The removal efficiency for iodine vapors exceeded 90% for multimicron size particles, but was low for 0.1 to 1.0 micron size particles. The combination of a deep carbon bed and high efficiency particulate air filter (HEPA) was superior to conventional filter systems.

10405 APTIC NO. 28123

Bodrov, V. I.

INVESTIGATION OF THE OPERATION OF A STEAM EJECTOR IN A CENTRAL VACUUM DUST-COLLECTOR INSTALLATION.

(Issledovaniye raboty parovogo ezhektora v tsentral'noy pylesosnoy ustanovke). Text in Russian. Vodosnabzh. i Sanit. Tekhn., no. 10:25-28, 1970. 4 refs.

The recommendation is presented that a central vacuum dust-collector with an operating radius of 150-200 m utilize steam at a pressure of 25 atm or higher, both to drive the air and for preliminary treatment of the dust. A dust-collector equipped with such a steam ejector could be operated with a single-stage LIOT water-film cyclone, eliminating the need for fine dust filters. The Laval-nozzle steam ejector proposed is simple, small, and requires 1.5 times less operating power than a conventional RMK-4 vacuum pump, and promises to be more reliable.

10406 APTIC NO. 28124

Zlotin, G. N. and V. A. Treplin

EFFECT OF THE SEMICONDUCTOR IGNITION DEVICE PPZ-1 ON THE COMPOSITIO OF THE EXHAUST GASES OF THE CARBURETOR MOTOR DURING ACCELERATION PERIODS.

(Vliyaniye poluprovodnikovogo pribora zazhiganiya PPZ-1 na sostav otrabotavshikh gazov karbyuratornogo dvigatelya no rezhimakh razgona). Text in Russian. Avtomob. Prom., no. 11:4-5, 1970. 2 refs.

Preliminary tests on a four-cycle, four-cylinder test engine demonstrated that use of the PPZ-1 electronic ignition device reduces carbon monoxide emissions in the acceleration regime from 4-12% (with conventional ignition) to 1.5-6%, while corresponding values for medium loading of the engine are 1.7-8 and 1.5-3.5%, respectively. Electronic ignition also resulted in a 1.5-fold reduction in free-hydrogen content of the exhaust.

10407 APTIC NO. 28127

Sato, Kiyoshi

INDUCTION PIPE-EQUIPPED INCINERATOR.

(Yudodanshiki jinai shokyakuro). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 45-8951. 3p., March 31, 1970. (Appl. Aug. 11, 1967, claims not given).

An incinerator is described with an improved preheating system and reduced gravitational pressure of the refuse. Conventional incinerators generally comprise a drying chamber, combustion chamber, and a rostrum or fire grating in between. When garbage or other moist refuse is piled up on the rostrum, incineration is difficult because the waste is pressed together by its own weight. The bottom of the drying chamber or preheating system in the newly designed incinerator is a rostrum or fire grating which separates this chamber from the primary combustion chamber located underneath. On both sides of the drying chamber are the secondary combustion chamber and the smoke separation chamber. Several induction pipes penetrate through the drying chamber in a downward slanting direction from the secondary combustion chamber to the smoke separation chamber. Another rostrum is provided in the lower part of the primary combustion chamber. Easy to burn refuse can enter through a port directly to the primary combustion chamber, while another entry port is on top of the drying chamber. The primary air intake port is located below the lower rostrum, and the secondary air intake port combined with a preheater plate is located on the side wall of the secondary combustion chamber. Refuse is burned in the primary combustion chamber, and the hot gases there generated ascend into the secondary combustion chamber where they are mixed with preheated secondary air to give more perfect combustion. The gas then proceeds through the induction pipes into the smoke separation chamber and to the chimney. Since the pipes slant downward, the particles contained in the smoke are effectively separated in the smoke separation chamber where the smoke changes its direction to upward. Refuse in the preheating chamber is held there and heated more effectively because of the pipes and more space.

10408 APTIC NO. 28128

Wyatt, Samuel

U. S. RADIUM BOOSTS QUALITY AS IT REDUCES COSTS.

Ceram. Age, 87(2):13-15, Feb. 1971.

Installation of a unique, semi-automated furnace by United States Radium Corp. greatly improved their capability to produce high quality phosphors, particularly as to particle size and distribution in the particulate materials. Rated at 1500 cfh, the new kiln operates with 20% less natural gas fuel than the old ovens. Efficiency of the furnace is aided by a water-sealed hearth which prevents cold air infiltration. Because both sides and roof of the kiln are well insulated, fuel is conserved, noxious fumes are kept inside, and the temperature of the plant is kept at a bearable level. The new kiln, operating only 10 hours per day, processes more phosphors than the 20 old batch ovens which were worked 24 hours per day. A maximum of only two men is needed to operate the kiln whereas the old oven method required 10 men for three shifts. Because the kiln uses 20% less fuel than the twenty batch ovens, the size of the scrubber needed is proportionately less, and air pollution control is simplified. Operation of the kiln is described, and cost savings are indicated.

10409 APTIC NO. 28130

Inculet, I. I. and G. S. P. Castle

A TWO-STAGE CONCENTRIC GEOMETRY ELECTROSTATIC PRECIPITATOR WITH ELECTRIFIED MEDIA.

ASHRAE (Am. Soc. Heating, Refrig. Aircond. Engrs.) J., 13(3):47-52, March 1971. 3 refs.

A two-stage concentric electrostatic precipitator is designed so that particle collection takes place in the second field on a cartridge-type dielectric collector. Whether in the form of fibrous material or any array of rods and plates, the dielectric material serves the dual purpose of increasing the local electric field and the total collection surface. The charging, first stage of the precipitator includes a fine wire mounted axially but insulated from an inner grounded cylinder. A high voltage positive polarity is connected to the wire and the resulting divergent field gives rise to a corona discharge that fills most of the cylinder with a supply of positive ions. By placing a positive polarity potential on an outer cylinder, a convergent collection field is produced in the second stage through which air flows at the reduced velocity necessary for complete collection. Four replaceable cartridges made from terylene fibers were tested in a 1000 cfm unit. Collection efficiency after 30 days operation was 99.6%; ozone generation, 2 pphm; and pressure drop, 0.33 in.

10410 APTIC NO. 28138

Blair, J. M.

ATOMIZING SPRAYS CONTROL COAL DUST, SUBDUE METHANE IGNITIONS.

Coal Age, 76(3):89-91, March 1971. (Presented at the Coal Mining Institute of America Meeting, Pittsburgh, Pa., Dec. 11, 1970.)

Careful investigation of methane gas ignitions in bituminous coal mines has indicated that they have been caused by sparks created by the tungsten carbide bits of mining machines striking hard intrusions or streaks of rock in the coal seam or draw slate. Made of bratticy board and brattice cloth, a simulated coal face was constructed to test the Deron atomizing spray for preventing gas ignitions. A gas burner from an old side arm hot water heater was used to supply natural gas, and a 10,000-V furnace igniter was suspended over the urner to provide a constant and reliable source of ignition. The simulated entry was ventilated with a Joy 15-hp auxiliary fan, delivering 12,700 cfm of air to the end of the tubing. To include tests on dust in the experiment, an air-slide rock duster was used to blow coal dust into the face in front of the sprays. In addition to the 140 cfm of compressed air from the spray nozzles striking the coal face, experiments have proven that a venturi action is present. In spite of two gas ignitions while using the atomizing spray, high hopes still exist for their success as investigation revealed that, in both cases, the sprays were partially plugged by dirt. Particle size of the dust used in the experiment is indicated in relation to the dust suppression action of the Deron sprays. When three of the Deron sprays were used, the flame was extinguished immediately.

10411 APTIC NO. 28144

James, J. Douglas

STATUS REPORT OF CUPOLA EMISSIONS.

Mod. Casting, 59(3):39-40, March 1971. (Presented at American Coke and Coal Chemicals Inst. Annual Meeting, 1970.)

All cupola emissions are uneconomical to control since the collected material has little or no value and its collection adds no value to the foundry's product. The emissions most difficult to collect are those with large concentrations of very fine particles 5 micron and smaller. The amount of metallic oxides occurring in a cupola emission is related to presence of the respective metals in the scrap charged and partial vapor pressures at the temperature of the cupola melting zone. Oxides of silicon and calcium result from lining erosion, embedded molding or core sand on cast metal returns, and dirt from the scrapyard or from limestone flux. Combustible materials include coke particles, vaporized or partially burned oil and greases, and other contaminants swept up the stack by hot gases. Blast rate and the percent of coke in the charge may increase cupola combustible materials, while the use of an afterburner would decrease the quantity of combustible particles released to the atmosphere. Operating practices which affect emission levels are also indicated. The measurement or sampling of contaminants emitted from the cupola is mentioned. The four basic emission control systems which the iron foundry industry utilizes include dry mechanical collectors, wet collectors, fabric filters, and electrostatic precipitators.

10412 APTIC NO. 28146

Yanagi, Fusao

DISPOSAL OF SEWAGE SLUDGE INCINERATION ASH OR THE LIKE.

(Gesuidodei tono shokyakubai no shorihoho). Text in Japanese. (Ishigaki Machineries Co., Ltd. (Japan)) Japan. Pat. Sho 45-39317. Dec. 10, 1970. (Appl. Aug. 15, 1966, claims not given).

An effective disposal method for the ash produced from incineration of sewage or industrial waste sludge is described. In the dewatering or dehydration of sludge or the like by means of a vacuum filter, coagulants such as iron chloride or iron sulfide and slaked lime are generally added to the sludge to cause flocculent masses to form. Thereafter the sludge is filtered to remove the solids and incinerate them. However, ash is produced in large quantities as a result of the incineration, while bad odors and poisonous gases are also generated when heavy oils or the like are utilized as auxiliary fuel. In the present method, sludge treated with coagulants and filtered for dehydration is incinerated at 800 C or higher. By means of a cyclone, the ash is separated into that chiefly composed of calcium oxide and that composed of ferric oxide. The CaO is recovered and used as coagulant to induce flocculant masses to form in the sludge to be filtered; the Fe203 ash is mixed with water and used as a reaction agent for hydrochloric acid and sulfurous acid gas generated from the incinerator, thus forming iron chloride. The solution is then separated into solid and supernatant. Only the acid supernatant containing iron is recovered and utilized as a coagulant for the raw sludge.

10413 APTIC NO. 28147

Omura, Masakatsu, Masao Sakai, and Sukeyoshi Marui

PROTECTION DEVICE OF HANGING INSULATOR OF DISCHARGE ELECTRODES FOR ELECTRIC DUST COLLECTOR.

(Denki shujin sochiyo hoden denkyoku tsurika garasu no hogo sochi). Text in Japanese. (Nihonkai Heavy Industry Co., Ltd. (Japan)) Japan. Pat. Sho 45-31000. 5p., Oct. 7, 1970. 1 ref. (Appl. Aug. 9, 1965, claims not given).

In conventional electric dust collectors, insulation of the discharge electrodes was not quite adequate, causing lower voltage, spark discharge, and short circuits. It was not possible to operat these collectors at a stable and high voltage due to uneven and sudden rises in temperature. The present invention prevents dust from adhering to the discharge electrodes and also damage to the insulators due to a sudden rise in temperature. This is accomplished by jetting hot air, adjusted to an adequate temperature. This is accomplished by jetting hot air, adjusted to an adequate temperature, from the outlets of ring pipe nozzles which are at an angle of 30 deg to the pipe axis. An automatic temperature control system can be installed to maintain the temperature of the insulator chamber in accord with the temperature of the gas in the dust collecting chamber. Cold air can also be jetted to prevent overheating of the hanging insulators if necessary.

10414 APTIC NO. 28148

Hayashi, Hiroshi and Takayoshi Sugimoto

STUDY ON THE METHOD OF EXHAUST PURIFICATION CATALYTIC REACTOR ABILITY TEST. (FIRST REPORT). THE SYSTEM OF TEST METHODS AND THE TEST METHOD ON ACTIVITY OF SIMPLE SUBSTANCE FOR CATALYST.

(Haikijoka shokubai reakuta seino shikenho no kenkyu. (Dai 1 po). Shikenho no taikeo oyobi shokubei tantai kassei shikenho). Text in Japanese. Preprint, Society of Automotive Engineers of Japan, Inc., Tokyo, 8p., 1970. (Presented at the Society of Automotive Engineers of Japan, Inc., Fall Meeting, Tokyo, 1970, Paper 53.)

With the introduction of stricter emission standards, the study of catalytic reactors for purifying automobile exhaust gas is assuming major importance. At present, there is insufficient cooperation between Japanese auto manufacturers and and catalytic reactor manufacturers with regard to their respective design requirements and standards for evaluating reactor ability. An evaluation procedure is described that consists of a catalytic 'simple substance' test, a reactor 'simple substance' test, a bench test (by engine and chassis dynamometer), and road test. The type of data obtained by this procedure and its interpretation are discussed. The importance of catalyst space velocity in relation to gas temperature is noted, and comparative test data is presented for various catalysts.

10415 APTIC NO. 28153

Tanaka, Kusuyata and Takeshi Yamada

DESULFURIZATION OF SMOKE AND CONTROL OF NITROGEN OXIDE.

(Haien no datsuryu to chisso sankabutsu no yokusei). Text in Japanese. Nippon Kikai Gakkai Shi (J. Japan Soc. Mech. Engr., Tokyo), 74(626):247-256, March 1971. 36 refs.

Representative flue-gas desulfurization methods are reviewed and some technical aspects of nitroegn oxides control are noted. Technical difficulties associated with smoke desulfurization are due in part to the fact that the quantity of sulfur oxides to be removed is very small against the total volume of gas to be treated. For example, when heavy oil containing 3% sulfur is burned, the total gas produced amounts to 13 cu nm/kg, of which sulfur oxides account for only 0.17%. Should the gas be desulfurized by 90%, the sulfur oxides density will be only 0.017%. The desulfurization methods discussed include the Shinkoshi method, a scrubbing system developed by the Kanagawa Prefecture Industrial Laboratory. In this system, tubular nets are installed between the inner and outer tubes of the equipment. An absorbent solution flows along these tubular nets to form a liquid membrane in the net openings. Smoke gas to be desulfurized is introduced from the inner tube at a right angle to the membrane. Pilot plant tests of the system indicated a desulfurization rate of more than 98% for 3000 cu m/hr emissions from an iron ore sintering furnace. Ammonia water (0.25% NH3) was used as the absorbent. Other wet systems described are the Wellman-Lord, Grillo, Chemico, and Stone and Webster-Ionic methods. Dry systems described include the activated carbon and contact oxidation methods. Basic approaches to preventing the formation of nitrogen oxides are outlined.

10416 APTIC NO. 28154

Kusama, Akio

RECENT IMPROVEMENTS ON GAS-COMBUSTION EQUIPMENTS.

(Saikin no gas nenshosetsubi no shimpo). Text in Japanese. Netsu Kanri (Heat Management: Energy and Pollution Control), 23(2): 12-19, Feb. 1971.

Pollutant-free city gas and natural gas are increasingly being used to abate the pollution problems caused by heavy-oil combustion, the consumption of gas by industry increasing by 19.7 million cu m annually in recent years. It is expected to reach 30.9 million cu m in 1970. Noting this favorable trend for the fuel-gas industry, the merits of city gas as a heat source are stressed compared with electricity and other fuels. Despite the advantages city gas offers even as an industrial heat source, it has not been used as widely as it might be. This is due primarily to Japan's lagging technology in the field of gas combustion equipment, in contrast to the U. S. where technological developments in the field have been numerous. Gas furnace and combustion equipment for industrial application should meet the following technical requirements: 1) give high heating power and high temperature; 2) give stable flame and ensure against dying out or imperfect combustion; 3) permit adjustment of heating power and temperature; 4) be easy and safe to operate; and 5) permit automation and unattended operation. The most remarkable new gas burners for industrial use is the Honeywell Flame Retention Burner. Preheated by its unique pilot flames, this burner increases the capacity of the main flame tenfold over that of a conventional burner. Other advantages are superb electrical characteristics, such as the high conductivity of the flame, which allows combustion to be easily followed by electrical means. Also described are new air gas mixing devices, automatic ignition and control equipment, and a gas-heated crucible furnace designed to melt light alloy-like aluminum and keep it molten.

10417 APTIC NO. 28157

Masuda, Senichi

THE LATEST TREND IN THE ELECTROSTATIC PRECIPITATING TECHNIQUE.

(Saikin no denki shujinki). Text in Japanese. Sangyo Kankyo Kogaku (Ind. Environ. Eng.), no. 67:68-78, 1969. 26 refs.

The technical, social and economic environment of the electrostatic precipitator has changed constantly since F. G. Cottrell patented the device in 1905. And it is expected that the environment of the electrostatic precipitator will continue to change with the times, the development of the economy, and the promotion of human welfare. At present, there are three main problems in the electrostatic precipitating technique. The first problem is how to prevent, at minimum costs the decrease of collection efficiency that accompanies the phenomenon of counter-ionziation, which occurs in the case of airborne particles with high electrical resistivity. The second problem is how to increase the collection efficiency for submicron particles; the third is how to forecast accurately collection efficiency. Many studies are being conducted to solve the problems, and some of them are successful. The results obtained and the latest trend in the electrostatic technique are discussed under the following headings: inlet-gas conditioning for prevention of the counter- ionization by lowering electric resistivity of the airborne particles; utilization of electrostatic cohesion for improvement of collection efficiency for submicron particles; utilization of the condenser added parallel to the electric power source; clarification of the physical phenomena in the collection space; measurement of electric resistivity of the airborne particles; constructional and mechanical problems; introduction of a statistical way of presenting collection efficiency; and utilizatio of an electric field.

10418 APTIC NO. 28161

Schulz, Paul-Theodor

EMISSIONS AT SUGAR BEET PULP DRYERS.

(Emissionen an Zuckerruebenschnitzel-Trocknungen). Text in German. Tech. Ueberwach. (Duesseldorf), 12(2):49-52, Feb. 1971. 2 refs.

Waste gas from eight rotary drums for drying sugar beet pulp was analyzed and its fly dust content determined. All rotary drums wer heated with soft or hard coal. Cleaning of the waste gas was done mainly with centrifugal separators. On the whole, relatively small carbon dioxide concentrations were measured at all plants, although concentrations determined in each individual case differed widely, ranging from 1.9% by volume at a waste gas quantity of 53,800 cu m/hr to 9.2% by volume at a waste gas quantity of 102,600 cu m/hr. Dust concentrations of 1.23 and 3.68 g/cu m were measured in the untreated gas, which are low compared to similar dryers in other industrial plants. The centrifugal dust collectors reached collection efficiencies between 94.1 and 97.8%. Dust concentration in the cleaned gas were 51 to 180 mg/cu m. The sulfur dioxide concentration at soft coal-fired dryers referred to O C/760 torr averaged 4.55 g/cu m. This relatively high concentration is due to the high sulfur content of the coal. At hard coal-fired dryers, the SO2 concentrations in the waste gas were between 0.502 and 0.320 g/cu m.

10419 APTIC NO. 28162

Komeichi, Narumitsu, Tatsuo Okamoto, and Yukio Nagasawa

A NEW DUST TRAPPING DEVICE.

(Jinai hoshu sochi). Text in Japanese. (Fuji Electric Co., Ltd. (Japan)) Japan. Pat. Sho 45-28480. 3p., Sept. 17, 1970. 1 ref. (Appl. Dec. 15, 1965, claims not given).

Electric dust collectors have been large to prevent the dust from flying about, while they have also been unable to collect dust with an extremely high or low resistance. In the present device, the discharge electrodes have been lengthened and with enough direc high voltage to generate either positive or negative corona discharge between adjacent electrodes. Thus, static is produced between the charge dust, firmly combining it together to be effectively collected with a cyclone or bag filter. The dust also has a high density and large particle diameter. New equipment need not be designed but, according to characteristics of the dust, all that is required is to adjust the cross section through which the gas passes. Installation takes very little time, and equipment costs are reduced.

10420 APTIC NO. 28166

Ikemori, Kametsuru

THEORIES AND PRACTICAL APPLICATIONS OF DUST COLLECTOR.

(Shujinsochi no riron to oyo). Text in Japanese. Preprint, Society of Electrochemistry, Tokyo (Japan), Kanto Div., 62p., 1971. (Presented at the Seminar on Air Pollution, Tokyo, Japan, Feb. 3-4, 1971, Paper 3.)

The theory, construction, and performance of various types of dust collectors are reviewed. Included are inertial separators, centrifugal separators, filters, and scrubbers. The advantages and disadvantages of each type are noted, and formulas are provided for calculating such factors as dust collecting efficiency and pressure loss. The comparatively simple inertial separators effectively collect powdered dust or mist 20-30 micron or larger. Because their pressure loss is low, these collectors are widely used as predusters in combination with high-performance collectors. Cyclones are compact and efficient but must be built from expensive materials when used for the separation of abrasive dusts. Cyclones can be roughly classified as vortex or axial-flow: the former are effective with dusts 5 micron or larger and the latter with dusts 10 micron or larger. Filters are especially useful in the collection of dusts 1 micron or less, and bag filters of glass wool enable dusts to be separated from gases 100 C or higher. Cyclone scrubbers are generally capable of collecting dusts between 5-10 micron or larger, while venturi scrubbers, despite their greater pressure loss, can arrest dust of about 0.1 micron.

10421 APTIC NO. 28172

Miura, Mitsugu

NEW TYPE OF DUST COLLECTING AND DESULFURIZATION EQUIPMENT.

(Shinkeishiki no shujin datsurya sochi). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 7(1):12-21, Jan. 1971.

A new gas scrubbing and dust collecting apparatus is described that uses much less water than traditional equipment. The device is a cylinder into which gas is introduced tangentially at 20 m/sec and through which the gas rises at the same speed. As the gas swirls through the cylinder, a film of water at the bottom is dispersed as a fine spray to contact dust and sulfur dioxide contained in the gas. The liquid containing the dust and that containing the SO2 are separated by the motion of the gas. A three-stage version of the device, which is essentially a cyclonic venturi scrubber, reduces the floor space required by an SO2 absorption tower to 1/10 that of conventional towers. The apparatus can also be used with mixed fumes of aluminum chloride, ammonium chloride, hydrogen sulfide and SO2; mixtures of sulfur trioxide and sulfuric acid mist; tar mist; ferrite particulates; oxidized lead fumes, and other exhaust pollutants.

10422 APTIC NO. 28173

Yoshida, Konen, Tadao Takeuchi, and Kojiro In

PREPARATION OF AN AGENT ACTING BOTH AGGREGATION OF CHEMICALS AND REMOVAL OF SULFUROUS ACID GAS IN WASTE FLUE GAS.

(Endo haigasu chu no aryusan gasu no jokyo o kaneta yakuhin gyoshuzai no seiho). Text in Japanese. Sangyo Kankyo Kogaku (Ind. Environ. Eng.), no. 68-69:13-18, Aug. 1970. 15 refs.

An aggregating and precipitating agent was produced at low cost from sulfur dioxide in flue gas. Gas containing air and sulfur dioxide was oxidized by passing through a catalyst and was then contacted with an aggregation agent containing red clay, iron oxide and residual alumina. Prior to contact with the flue gas, the raw materials used for the aggregating agent had been powdered, kneaded with water, and moulded. After reaction with the flue gas, the aggregating agent was divided into pieces about 10-cm long and tested for decolorization. The solubility of the sample was first measured and then a suspension with a 1000 ppm solubility concentration was prepared. Of this, 1-25 ml was added to Direct Brown 3G and four other dye solutions. After modification of its pH, the solution was stirred and separated in a centrifugal separator. The extinction degree of the supernatant liquid was the measured. In general, solubility and decolorization rates were highest near the entrance of the absorption surface.

10423 APTIC NO. 28180

Stahlmann, Dirk and Udi Wiesmann

THE INFLUENCE OF POISONING IN THE CATALYTIC OXIDATION OF CARBON MONOXIDE ON ACTIVATED CARBON.

(Einfluss der Vergiftung bei der Katalytischen Kohlenmonoxid-Oxydation an Aktivkohle). Text in German. Erdoel Kohle (Hamburg), 23(12):805-811, Dec. 1970. 14 refs.

The causes of a decrease in effectiveness of the catalytic oxidation of carbon monoxide on activated carbon due to carbon dioxide, water, and oxygen have been investigated by studying degassing of activated carbon (decomposition of surface oxides), oxidation of CO by O_2 on the activated carbon, and oxidation of the activated carbon by air. About 5% CO is oxidized to CO_2 by activated carbon in a differential reactor degassed at 1100 C already at room temperature. But the reaction intensity decreases because the O_2/CO_2 mixture is not free of hydrogen which reacts with O_2 to H_20 and is absorbed on the surface and because also oxygen is subject to chemisorption on an activated carbon surface from which oxides were removed. Experimental results thus show that the decrease is due to physical adsorption of CO_2 and to chemisorption of H_20 and of O_2. The kinetics of the decrease in activity due to chemisorption can be expressed by the Elowich functions. The gassing period and temperature influence the activity due to alterations of the initial catalyst surface.

10424 APTIC NO. 28181

Fahrbach, Joerg

THE EFFECT OF LEAKS ON THE MEASUREMENT OF THE TOTAL THROUGHPUT OF VELOCITY AND OF CONCENTRATION IN PERFORATED FILTERS.

(Der Einfluss von Lecks auf den Gesamtdurchlass-Geschwindigkeits- und Konzentrationsmessungen an perforierten Filtern). Text in German. Staub, Reinhaltung Luft, 30(12):533-538, Dec. 1970. 8 refs.

Flow velocities in front of leaks of 0.1 to 5 mm diameter filters from two different fabrics were measured by Coenen's pyroelectric conductor method and compared with flow velocities recorded by the same method in front of intact filters to determine the effect of filter leaks on throughput. Concentration was measured in a similar manner by a scatter aerosol photometer. The effect of leaks not exceeding 0.3 mm at flow rates not exceeding 0.05 m/s was well defined by the Hagen-Poiseuille diaphragm and capillary flow theory; in the case of small leaks, the filtering mechanism of undamaged filters already played a role. Leaks of the order of 0.1 mm were soon following impact closed by room air. In the case of larger leaks, a flow velocity increase reduced the negative effect of the leak on filtration. Filters with a low pressure gradient minimized the effects of leaks.

10425 APTIC NO. 28182

Loeffler, Friedrich

SEPARATION EFFICIENCY AND PRESSURE LOSS OF FILTER MATERIALS OF VARYING STRUCTURE UNDER DIFFERENT CONDITIONS.

(Abscheidegrad und Druckverlust von Filterstoffen verschiedener Struktur bei unterschiedlichen Bedingungen). Text in German. Staub, Reinhaltun Luft, 30(12):518-522, Dec. 1970. 3 refs.

An automatic experimental arrangement is described in which on a filter hose of a filtering area of 1 sq m the loss of pressure, separation efficiency, and instantaneous dust concentration in the purified gas can be determined for any type of dust. The dust-laden air passes through the filtering material of the hose from the inside out, then passes a glass fiber filter. The pressure loss in the hose is measured by a ring balance manometer and continuously recorded. Separation efficiency is determined by weighing the dust retained by the hose and the glass filter. The dust cake is released from the hose by alternate stretching and slackening of the hose. The residual dust content in the purified air is calculated from the dust retained by the glass fiber filter. The procedure is demonstrated on the example of a cotton fabric hose and silica dust-laden air.

10426 APTIC NO. 28185

Radusch, Paul

PROCESS FOR PURIFYING CRUDE COKE-OVEN GASES.

(Koppers Co., Inc., Pittsburgh, Pa.) U. S. Pat. 3,556,721. 4p., Jan. 19, 1971. 3 refs. (Appl. Aug. 15, 1968, 9 claims).

A process is described for purifying crude coke-oven gases according to the principle of ammonia recycle scrubbing in which the ammonia that is to be removed is used for simultaneous removal of hydrogen sulfide. The disdavantage of previous methods was their relatively high consumption of steam for deacidification and distillation of the ammonia. The present process comprises flowing cooled and detarred crude gases through a three-stage gas scrubber, the top stage being charged with crude ammonia liquor. The aqueous effluent from this stage is returned to the top of the first stage, while the middle or second state is charged with deacidified recycle water. Thereafter, the aqueous effluents flow into a distillation column and then back into the second washing stage. (Author abstract modified)

10427 APTIC NO. 28186

Belinskiy, S. Z., V. S. Gur'yev, and V. S. Simkin

SELECTION OF A RATIONAL SYSTEM OF GAS PURIFICATION AFTER OPEN- HEARTH FURNACES OPERATING WITH AN INTENSIVE BLOWING-THROUGH OF THE BATH WITH OXYGEN.

(Vybor ratsional'noy sistemy gazoochistki za martenovskimi pechami, rabotayushchimi s intensivnoy produvkoy vanny kislorodom). Text in Russian. Stal, 30(10):956, Oct. 1970.

Studies of industrial installations showed dry electrostatic precipitators to be equally effective when operated with either a circular or rectangular venturi tube (residual dust content not greater than 100 mg/cu m in either case). Flow rate should not exceed 1.2 m/sec, while water consumption in the venturi tube is set at 1 liter/cu m with a pressure drop of about 700 mm H2O.

10428 APTIC NO. 28189

Kriz, Milan and Josef Vejvoda

LABORATORY STUDY OF THE OPTIMUM ADDITIVE FOR DESULPHURIZATION OF FLUE GASES FROM POWER PLANTS.

(Laboratorim studium optimalniho aditiva pro odsirovani spalin zkotelen atepelnych elektraren). Tex in Czech. Sbornik Praci UVP (Ustav Vyzkum Vyuziti Paliv) (Prague), no. 19:3-30, 1968. 12 refs.

The reaction of calcium carbonate, magnesium carbonate and natural carbonates with sulfur dioxide was studied simulating conditions existing in power plant flue gases. The apparatus used for measurement of the reaction of alkali earth carbonates with SO2 is described. CaCO3 was most effective in the desulfurization process with the highest conversion degree obtained at 1000-1100 C. Finely ground natural CaCO3 was more reactive with SO2 than pure CaCO3. The effect of gaseous phase composition on the reaction was investigated. Carbon dioxide additions resulted in a decrease of the degree of conversion, while the addition of steam affected the reaction favorably. Some addition of other components of flue gases (Al2O3, SiO2, Fe2O3) had negligible effect on the reaction. Pneumatic charging of CaCO3 into the combustion chamber is proposed

10429 APTIC NO. 28190

Walker, Robert L. and Birney R. Fish

ADHESION OF PARTICLES TO SURFACES IN LIQUID AND GASEOUS ENVIRONMENTS.

Preprint, American Association for Contamination Control, Sandusky, Ohio, 5p., 1965. 6 refs. (Presented at America Association for Contamination Control Annual Technical Meeting, 4th Miami Beach, Fla., May 25-28, 1965, Paper V-3.)

CFSTI: CONF-650577-1

Four basic mechanisms which act to retain particles to surfaces are reviewed: capillary, electrostatic, and molecular forces, and a time dependent force, termed 'Stefan Flow,' which is due to a viscous flow phenomenon. The three basic types of forces available for removing particles from surfaces are also considered: fluid dynamical (e.g., liquid or air streams), inertial (centrifugal, vibrational, gravitational), and direct mechanical contact (e.g., brushing or grinding). Current wind tunnel experiments to study both sets of forces are described, and their dependence upon particle radius noted. On the basis of theory, if the particle siz is reduced by a factor of 2, the capillary and Van der Waals (molecular) forces also will decrease by a factor of 2, while the electrostatic forces will decrease by a factor of 4. Removal force generally decrease more rapidly with particle size than do adhesive forces; thus, the smaller the particles the more difficult is removal. Mechanical contact techniques provide the method of choic where conditions permit, since they decrease in efficiency with particle size less rapidly than do the other removal techniques. (Author conclusions modified)

10430 APTIC NO. 28201

Dawson, David W.

DISCUSSION ON 'THE FORMATION AND CONTROL OF NITRIC OXIDE IN A REGENERATIVE GAS TURBINE BURNER'.

National Air Pollution Control Administration, Ann Arbor, Mich., Div. of Motor Vehicle Research and Development, 3p., 1970.

Several questions are posed on a previously published paper which presented analytical and experimental results to provide the gas turbine engineer with insight into the time constant involved in the formation, decomposition, and measurement of nitric oxide, as well as the effect of engine operating conditions and burner geometry on its formation. The question yet to be answered is which type or types of burner geometries and fuel introduction techniques can achieve the lowest NO emissions while retaining acceptably low emissions in hydrocarbons and carbon monoxide, as well as acceptable performance in intensity, efficiency, and pressure drop. It is asked why the rich primary zone burner with early quench was not considered a feasible solution. Also, would the authors comment on possible adverse effects of using the heavy truck and its associated high driveline losses to evaluate what emissions of a passenger car might be. Delaying the start of power transfer to 80% gasifier speed is suggested to have an appreciable effect on the lower power NO formation. Other questions concern instrumentation and test conditions.

10431 APTIC NO. 28204

Spitalnik, Zdenek and Miloslav Stary

RECOVERY OF SULFUR DIOXIDE FROM FLUE GASES OF POWER PLANTS.

(Zachycovani kyslicniku siriciteho z kourovych plynu tepelnych elektraren). Text in Czech. Chem. Prumysl (Prague), 11(2): 74-76, 1961. 6 refs.

The economic aspects of the recovery of sulfur dioxide from flue gases of power plants were considered. The material and energy balances were calculated for the following methods of SO2 removal and for recovery from flue gases: absorption of SO2 in a suspension of lime or limestone; ammonia methods (cyclical sulphate method, nitrate, and autoclave methods); and absorption in a magnesite suspension. The balance was calculated for SO2 content equal to 0.5, 0.35, and 0.15%. The costs of desulfurization of 1000 kWh were highest for the lime and limestone processes, where SO2 is not reclaimed. The desulfurization expenses decrease with increasing SO2 concentrations in flue gases and for processes in which SO2 is recovered for further use. On the other hand, the lime and limestone methods are more advantageous when investment expenses for removal of 1 ton of SO2 are considered.

10432 APTIC NO. 28206

Aikens, A.

DESTRUCTION OF ODOURS.

In: Gas Purification Processes. G. Nonhebel (ed.), London, George Newnes, Ltd., Chapt. 11, Part B, p. 456-468. 25 refs.

The design and operating features of the Oxycat oxidation catalyst system are reviewed. This system eliminates odors and other objectionable characteristics of process waste gases by oxidizing the combustible materials over platinum-coated porcelain rods at temperatures far below those required for direct flame incineration. The limiting temperature range through which the Oxycat functions is from 500-1800 F (260-982 C). The system is also used to obviate deposition of inflammable condensates in dust, thus reducing fire and corrosion hazards as well as maintenance costs, and to convert the chemical energy of process exhaust gas to useful heat.

10433 APTIC NO. 28209

Chlenov, A. G.

CONDITIONS FOR SMOKELESS BURNING OF MAZUT.

(Usloviya bezdymnogo szhiganiya mazuta). Text in Russian. Prom. Energ., 18(4):21-27, 1963. 6 refs.

Completely smokeless combustion of mazut requires fine atomization of the fuel, thorough mixing with air in a turbulent flow, and decomposition of high-molecular components by means of a high- voltage (up to 12 kV) discharge. These requirements have been met in non-Soviet burners employing nozzle atomizers in combination wit a continuous electrical discharge, but recirculating preheat schemes tend to cause undesirable thickening of the fuel.

10434 APTIC NO. 28212

Ward, E. R.

ORGANIC SULPHUR REMOVAL.

In: Gas Purification Processes. G. Nonhebel (ed.), London, George Newnes Ltd., 1964, Chapt. 8, Part B, p. 321-327. 18 refs.

Various catalysts are compared with respect to their effectiveness for the catalytic hydrogenation or oxidation of organic sulfur compounds in fuel gases. The catalysts are nickel subsulfide, copper or nickel thiomolybdate, molybdenum disulfide or cobalt thiomolybdate, zinc oxide, and zinc oxide and copper. Typical conditions under which the catalysts operate are given in tabular form. Included are the results obtained for the treatment of coal gas, refinery gas and vaporized light distillate with hydrogen, and hydrogen with a low carbon monoxide content.

10435 APTIC NO. 28218

Bennett, Brian J., Allan Walker, and Lynsay Robertson

AIR FILTER TESTING: A GUIDE TO THE EVALUATION OF FABRIC FILTERS. PART III—TEST RESULTS.

Aust. Refrig., Air Cond., Heat., 23(8):26-28, Aug. 1969.

The dust-holding capacity of two totally different types of air filtration media was tested according to the British Standard 2831 and the AFI code. Regardless of the filter media used, the British Standard test indicated a dust-holding capacity much greater than the AFI test. The British Standard test also indicated a rise in efficiency followed by a fall in efficiency during dust loading. The AFI test indicated a continuing rise in efficiency together with a rapid rise in resistance during dust loading. Experience indicates that these phenomena do, in fact, occur with most filters in practice, and it is concluded that, if used with discretion, the AFI code provides meaningful and useful information

10436 APTIC NO. 28221

Wood, A. H.

FUME COLLECTION IN STEEL WORKS.

In: Gas Purification Processes. G. Nonhebel (ed.), London, George Newnes Ltd., 1964, Chapt. 13, Part E, p. 573-576. 31 refs.

Oxygen steelmaking processes produce brown iron-oxide fumes predominantly 50 millimicrons to 5 microns in size. The volume of gases to be cleaned can be as high as 200,000 cu ft/min. Depending on the oxygen process used, dust loadings can be as high as 3, 8, or 10 grains/cu ft ntp. For chimney emissions from a large steelmaking vessel to have minimum visibility, the fume content must be reduced to 0.05 grains/cu ft ntp. The only forms of apparatus that will meet the severe requirements of 99-99.5% fume-removal efficiency are electrostatic precipitators, bag filters, and high energy-loss wet scrubbers. When large volumes of gas must be continuously cleaned, electrostatic precipitators are the most certain to give the required performance consistently with minimum power, maintenance, and labor costs.

10437 APTIC NO. 28223

Nonhebel, G.

CENTRIFUGAL GAS ABSORBERS.

In: Gas Purification Processes. G. Nonhebel (ed.), London, George Newnes Ltd., 1964, Chapt. 6, p. 219-228. 4 refs.

Conventional gas absorption towers containing packings or bubble plates are bulky and also unsuitable for use with absorbing liquids which have high viscosity or which tend to froth. As shown by British and American pilot studies, these disadvantages are overcome by absorption vessels in which the gas is brought into vigorous contact with droplets of water by means of an impeller. The pilot studies involved a double rotor absorber, a rotor-stator absorber, and a simplified, agitated gas-liquid contactor. Each apparatus was designed and tested at atmospheric pressure in studie on the absorption of carbon dioxide by mono and di-ethanolamine, respectively. The operating principles, design details and performance, of these absorbers are described. Also reported are power consumption in the units, pressure drop, flooding point, carry-over of liquor and mist in the gas stream, and the effect of solution temperature on absorptive capacity.

10438 APTIC NO. 28224

Stearman, F. and G. J. Williamson

SPRAY ELIMINATION.

IN: Gas Purification Processes. G. Nonhebel (ed.), London, George Newnes Ltd., 1964, Chapt. 16, p. 742-759. 6 refs.

In many industrial processes, it is necessary to remove spray droplets from gas streams to purify the gas and remove liquid which would contaminate a subsequent process, damage machinery, or constitute an undersirable atmospheric effluent; or to recover a useful liquid product of the process. Three types of separators are discussed which are suitable for removal of mechanically-formed spray droplets, most of which are greater than 50 microns: simple disengagement vessels, impingement collectors, and centrifugal separators. Data are presented on the performance and application of the various types of separators, and the factors affecting the choice of a separator (primarily the tolerable pressure loss) are discussed.

10439 **APTIC NO. 28225**

Fairs, G. Lowrie

REMOVAL OF ACID MISTS FROM CHEMICAL PROCESSES.

In: Gas Purification processes. G. Nonhebel (ed.), London, George Newnes Ltd., 1964, Chapt. 15, Part A, p. 683-720. 21 refs.

Many plant gases contain mists produced by condensation of acid particles. Such mists are usually much finer than those produced mechanically by carry-over from evaporators or distributors of absorption towers and consequently, are more difficult to scrub effectively. Condensation mists may be present in tail gases, where they constitute a nuisance, or they may have to be removed at an intermediate stage in a chemical process, e.g., to avoid catalyst poisoning in contact sulfuric acid plants. These acid mists are discussed with respect to their instability and fineness, sampling and sizing, and collection. Design and operating details and range of applicability are given for the following removal equipment: Calder-Fox scrubbers, electrostatic precipitators, hydrophobic fiber filters, ceramic candle filters, venturi scrubbers, and sonic agglomerators. Orders of power required to operate each type of equipment are noted.

10440 **APTIC NO. 28226**

Nonhebel, G.

TESTING PERFORMANCE OF EQUIPMENT FOR GRIT AND DUST REMOVAL.

In: Gas Purification Processes. G. Nonhebel (ed.), London, George Newnes Ltd., 1964, Chapt. 14, General Introduction, p. 577-580.

Performance testing of dust arresters involves sampling of gases carrying grit and dust to obtain overall efficiency of collection by weight and, more particularly, for determination of concentration of solids escaping. In addition, it is necessary to determine the size analysis of the solids leaving the arrester and in some cases the size analysis of the entering solids. The accurate collection of a representative sample of dust-bearing gas for the determination of weight concentration is complicated by at least three factors. First, the gas velocities and dust concentrations are not uniformly distributed across the duct. Secondly, centrifugal forces will throw the heavier particles to the outside of bends in ducts and consequently the size analysis of the dust burden will vary across the flue. Thirdly, some form of size analysis of the dust collected by the sampling apparatus is usually required, irrespective of whether the main gas stream is used for process purposes or discharged to the atmosphere.

10441 **APTIC NO. 28227**

Nonhebel, G.

GENERAL INTRODUCTION.

In: Gas Purification Processes. G. Nonhebel (ed.), London, George Newnes Ltd., 1964, Chapt. 1, p. 1-18. 36 refs.

Processes of gas purification can be divided into removal of gaseous impurities and removal of particulate impurities. Each category can in turn be subdivided into coarse cleaning, fine cleaning, and ultra-fine cleaning. A further subdivision, which applies particularly to removal of gaseous impurities, is into chemical and physical processes, each of which must be considered in terms of technical efficiency, maintenance of performance, and cost. In the context of gas purification, the application to project designs of method study techniques, the aim of which is to achieve worthwhile objectives by more efficient and economic means, is recommended. The method study should be followed by a critical examination of individual operations in purification processes to obtain data for plant design and operating methods. This in turn forms the starting point for further studies in the fields of maintenance, construction, and pipework design. Also discussed are the use of layout and pipework models in plant design, aerodynamic design studies, and surface physics of small particles.

10442 **APTIC NO. 28228**

Mott, R. A.

PRELIMINARY PURIFICATION OF CRUDE GASES.

In: Gas Purification Processes. G. Nonhebel (ed.), London, George Newnes Ltd., 1964, Chapt. 4, p. 77-120. 27 refs.

Preliminary purification of crude gases which arise from the carbonization of coal in coke ovens (coke-oven gas) and gasworks retorts (town gas), or from the gasification of coal or coke in gas producers (producer gas or water gas) and of coke in blast furnaces (blast-furnace gas) is considered. The purpose of such purification is to remove both vapors of tar, water, naphthalene, and benzole and mechanically carried solid particles of tar, naphthalene, and dust. In certain of the processes considered, preliminary purification includes the removal of ammonia gas. Purification of the crude gases is achieved by cooling or washing (usually with water or oil) and by electrostatic precipitation. Comparison is made between these procedures as they apply in coke-oven practice and gasworks practice. Separate sections deal with special features of the purification of producer gas, water gas, and blast-furnace gas. (Author introduction modified)

10443 **APTIC NO. 28229**

Green, K. D.

PROBLEMS IN BRASS FOUNDRIES.

In: Gas Purification Processes. G. Nonhebel (ed.), London, George Newnes Ltd., 1964, Chapt. 13, Part D, p. 559-572.

Fume, which is mainly zinc oxide, is generated in varying amounts during the melting of brasses in open, electrically heated or oil fired furnaces or crucibles. The gray zinc iron oxide fume is generally below the Ringelmann 2 requirement of the Clean Air Act of 1956. However, the presence of carbon black particles, produced by the use of oily swarf, lifts it well above this range. Fume concentrations of 6.0-0.5 grains/cu ft ntp can be expected, the higher value being associated with the swarf. Dust and fume efficiencies, and pressure drop, are given for wet and dry collectors applicable to the fume collection problem. The function of the extraction hood over the fume source is described and recommendations are made for ancillary equipment comprising ducting, extraction fan, and fume stack. The choice of a collector is noted to depend on required maximum collection efficiency, capital cost, running cost, and space requirements. A specific design example is presented for a plant for collection of fume from a brass foundry making ingot bars and located in a residential district.

10444 **APTIC NO. 28230**

Dransfield, F. and H. J. Lowe

ELECTROSTATIC PRECIPITATORS FOR LARGE BOILERS–INCLUDING COMBINATIONS WITH CYCLONES.

In: Gas Purification Processes. G. Nonhebel (ed.), London, George Newnes Ltd., 1964, Chapt. 13, Part B, p. 536-549.

A considerable quantity of fly ash is carried out of a boiler furnace in the flue gases when pulverized coal is burned. The carry-forward varies considerably with the type of firing; typical figures are 15-20% for cyclone furnaces, 45-55% for slag tap furnaces, and 80-85% for modern, fully water-cooled, dry-bottom furnaces. Dust burdens of about 10 grains/cu ft ntp are usual from the latter type of furnaces. The principal means of removing the fly ash is the electrostatic precipitator of which the two main types are tubular and plate. A good feature of tubular precipitators is that the gas cannot bypass the treatment zone; on the other hand, it is difficult to obtain uniform gas distribution among the tubes, and reentrainment of precipitated dust tends to be high. Plate precipitators are generally more compact, a feature useful in very large installations. Precipitators are commonly used for efficiencies up to 98.5%. For efficiencies of over 99%, a combination of a mechanical collector (usually an arrangement of cylones) preceding the precipitator is preferred. Factors influencing the performance of precipitators and mechanical collectors are discussed.

10445 APTIC NO. 28231

Murray, J. J. L.

PROBLEMS OF THE CEMENT INDUSTRY.

In: Gas Purification Processes. G. Nonhebel (ed.), London, George Newnes Ltd., 1964, Chapt. 13, Part C, p. 550-559.

Wet and semi-dry processes of cement manufacture are discussed with reference to sources of dust generation and control equipment. In the wet process, the first stage of flue gas cleaning takes place when kiln dust and grit are caught by wet slurry-coated chains. The final cleaning of the gas is commonly achieved by use of electrostatic precipitators. In suitable circumstances, effective use can be made of cyclonic separation, but there is always the possibility of very small particles remaining consistently airborne. The use of cloth filters other than siliconized glass fabric is precluded because of possible high temperatures. In the semi-dry process, dry grinding produces a dust that is all usable raw material. The highest possible efficiency of dust recovery is achieved by a mechanical or cyclone system followed by electrical precipitation or cloth filters. Plant location, prevailing winds, presence of hills or tall buildings, and chimney height are all factors governing to some extent the final performance of an electrostatic precipitator and other dust control equipment.

10446 APTIC NO. 28234

Barbouteau, L. and R. Galaud

REGENERATIVE PROCESSES FOR GAS ABSORPTION.

In: Gas Purification Processes. G. Nonhebel (ed.), London, George Newnes Ltd., 1964, Chapt. 7, p. 229-274. 11 refs.

The purification of a gaseous mixture by the absorption in a liquid of one or more of its components is described. By heating or reduction of pressure, the gas is desorbed from the liquid, which can be reused. This process is illustrated by the removal of hydrogen sulfide from the natural gas treated at a plant at Lacq, France. The gas at Lacq leaves the wells at 150 C and 600 kg/sq cm; it contains 15% H2S, 10% carbon dioxide, and some condensable hydrocarbons. The process of liquor regeneration usually takes place in a column fitted with plates. The rich solution from the bottom of the absorber is subjected to reduced pressure in a degassing vessel to liberate the hydrocarbons absorbed before the solution enters the regeneration column. Special consideration is given to two types of washing, with water (i.e., partial desulfurization with water), and with an amine, i.e., total desulfurization with water), and with an amine (i.e., total desulfurization by chemical action). Criteria for the selection of a regenerative process are noted, including the nature of the absorber, the nature of the gas to be treated, the purity of the commercial gas to be obtained, and the cost of the energy available at the treatment plant.

10447 APTIC NO. 28249

Bennett, Brian J., Allan Walker, and Lynsay Robertson

AIR FILTER TESTING: A GUIDE TO THE EVALUATION OF FABRIC FILTERS. PART 1–THEORY AND PRACTICE OF FABRIC FIBRES.

Aust. Refrig. Air Cond., Heat., 23(6):27-29, 63, June 1969.

The mechanisms of dust collection on filter fibers and factors influencing the performance of air-conditioning filters are evaluated. Heavier and larger dust particles are collected by impaction and straining, the effectiveness of which are independent of fiber type but related to fiber density. Submicron particles are effectively collected only by interception and diffusion. Interception effects decrease in importance with decreasing particle size while diffusion effects increase in importance. The performance of a filter can be influenced by varying the fluid (air) velocity, the depth of the filter, and the exposed surface area for a given filter medium. Variations in these factor will affect the dust arrestance (efficiency), the initial resistance, and the total dust-holding capacity. Since these qualities cannot be improved at the same time, a well-designed filter represents a compromise in operational requirements. The optimum performance of a filter is reached when a minimum amount of fibers are so located that they provide an acceptable arrestance and dust-holding capacity.

10448 APTIC NO. 28261

Fife, J. A.

DESIGN OF THE NORTHWEST INCINERATOR FOR THE CITY OF CHICAGO.

Proc. Natl. Incinerator Conf., Cincinnati, Ohio, 1970, p. 149-160. (Discussion, p. 82-84.) (May 17-20.)

A 1600-ton/day incinerator now under construction in Chicago is described. This plant is the first precipitator-equipped, refuse burning, water-walled furnace, steam-generating incinerator designe for use in the United States. Equipment and operating cost data are presented for the plant and compared with that for alternate refuse-burning systems. The general arrangement of facilities and the engineering reasons for the plant capacity and the air pollution control system specified are presented. Design specifications are reported for the steam system, stoker types, residue conveyors, boiler auxiliaries, and electrostatic precipitators. Specified precipitator efficiency is 96.87%. (Author abstract modified)

10449 APTIC NO. 28262

Sebastian, F. P. and M. C. Isheim

ADVANCES IN INCINERATION AND RESOURCE RECLAMATION.

American Societ of Mechanical Engineers, New York, Incinerator Div. Proc. Natl. Incinerator Conf., Cincinnati, Ohio, 1970, p. 71-78. 7 refs. (Discussion, p. 15-16.) (May 17-20.)

A tertiary sewage-treatment plant near Lake Tahoe is designed to keep organic and chemical nutrients from entering the lake. Lime is used for phosphate removal, with activated granular carbon providing the final effluent polishing step. The spent carbon is regenerated, the spent lime dewatered and calcined for reuse, and the sludge incinerated in multiple-hearth furnaces. Details of these three thermal processes are presented, including measures taken to purify exhaust gases from each furnace. Gases from the carbon regeneration furnace are first deodorized in an afterburner, than passed through a cyclonic scrubber. Exhaust gases from the sludge incinerator and lime-recalcining furnaces are treated in three-stage impingement-type wet scrubbers. Cost data are reported for the processes described. Also noted are representative temperatures for the various hearths and results of a typical ash analysis.

10450 APTIC NO. 28265
Feld, Walther

PROCEDURE FOR RECOVERING SULFUR BY OXIDIZING HYDROGEN SULFIDE.

(Procede de recuperation de souire par l'oxydation de l'hydrogene sulfure). Text in French. (Assignee not given.) French Pat. 387,438. 4p. July 9, 1908. (Appl. Feb. 21, 1908, 5 claims).

The simulataneous introduction of hydrogen sulfide and sulfur dioxide gases into a water bath causes a reaction yielding elemental sulfur and water. Due to secondary reactions, especially in cases where the reacting gases are highly diluted, a very low sulfur yield results. Attempts to correct this defect by dissolving the gases in a magnesium chloride solution has been unsatisfactory, since the product is of low quality and difficult to process. The patent proposes to dissolve the gases in an organic solvent, such as a residue of petroleum distillation. These hydrocarbons are not only good solvents of the sulfur but the inhibit the information of such products as hyposulfites and polysulfuric acids.

10451 APTIC NO. 28267

SULPHURIC ACID, FERTILISERS AND ELEMENTAL SULFUR FROM FURNACE GASES.

Chem. Eng. Mining Rev., 30(350):49-51, Nov. 15, 1937.

About 20 tons/day of sulfur is evolved in the zinc roasting section and 160 tons in the lead roasting section at Trail, B. C. About 60% of the content of the zinc gases is fixed directly as sulfuric acid; the balance is absorbed by passing through several towers until the sulfur dioxide content is reduced from 6% to 0.1%. The resulting ammonium bisulfite soulution is then treated in a tower with sulfuric acid; SO2 is liberated and ammonium sulfate solution obtained from which the salt may be crystallized by evaporation. The SO2 gas, together with oxygen from a liquid-air distillation plant, is blown into a modified water-gas producer, where the reaction with incandescent coke produces carbon dioxide and sulfur gas, plus a certain amount of carbon oxysulfide and carbon monoxide. Sulfur dioxide is added to the exit gases in the proportion required to convert the oxysulfide to CO2, and the gases lead to waste-heat boilers and a Cottrell electrostatic plant, where liquid sulfur is produced. Further treatment by electrostatic precipitators raises the grade of the sulfur to 99.95%. Present production of the sulfur plants is 450 tons of sulfuric acid/day and 45 tons of sulfur/day.

10452 APTIC NO. 28271
Francis, W.

FLUE GAS-WASHING PROCESSES. PART FOUR.

Power Works Eng., vol. 41:103-105, April 1946. 5 refs. Part I. Ibid., vol. 41:17-21 25, Jan. 1946. Part II. Ibid., vol. 41:37-40, Feb. 1946. Part III Ibid., vol. 41:75-77, March 1946.

The recovery of by-products from gas washing plants by using lime as the alkali appears to be practicable. Cement and sulfuric acid are produced in one method. The second process, the decomposition of the washer solids by ammonium carbonate, to produce ammonium sulfate and calcium carbonate, appears to be feasible if complete oxidation of sulfite to sulfate can be achieved. An alternative is to scrub with a sodium sulfite-bisulfite solution, and to precipitate the fixed SO2 by the addition of zinc oxide. The zinc sulfite thus formed may be decomposed at low temperatures to give concentrated SO2 and zinc oxide, which is used again. Solutions of ammonia or ammonium carbonate may be used as the scrubbing medium, producing ammonium sulfate and sulfur. The capital and running costs for this system probably will be lower than those for any other system of gas washing with recovery of by-products. (Author summary modified)

10453 APTIC NO. 28272
Fulker, R. D.

ADSORPTION.

In: Gas Purification Processes. G. Nonhebel (ed.), London, George Newnes Ltd., 1964, Chapt. 9, p. 328-366. 11 refs.

Activated carbons have strongly selective powers for the adsorption of organic vapors from gases, even in the presence of water vapor, and are widely used for gas purification and solvent recovery applications. Their outstanding ability to recover solvents from low concentrations easily and inexpensively is of vital importance in processes in which large quantities of air may be present, or to prevent the concentration of a solvent from reaching inflammable or toxic proportions. Processes such as rubber coating, the manufacture of artificial silk and acetate film, dry cleaning, and photogravure printing evaporate organic solvents in large volumes of air which may be efficiently recovered by the carbon adsorption process. The design of a carbon adsorption solvent recovery plant is considered under the following headings: collection of evaporated solvents; the adsorption process during which the carbon is charged with the solvent; the steaming or stripping process and collection of stripped solvent; the drying and cooling of the carbon in preparation for the next adsorption charge. Also discussed are instruments for process control and safety considerations in plant design.

10454 APTIC NO. 28284
Burchsted, C. A.

ENVIRONMENTAL PROPERTIES AND INSTALLATION REQUIREMENTS OF HEPA FILTERS.

International Atomic Energy Agency, Vienna (Austria), Treatment Airborne Radioactive Wastes Symp. Proc., New York, 2968, p. 175-191, 10 refs. (Aug. 26-30.)

The ability of high-efficiency particulate air (HEPA) filters to withstand severe environmental conditions is often critical to reliable operation of a contaminated exhaust system. Findings related to their installation, mechanical strength, and heat, moisture, and corrosion resistance are discussed. As a result, wood-cased filter units are recommended in preference to steelcased filter units whenever possible; they should also have rabbeted casing joints, not butt joints. The limiting temperatures for continuous exposure of HEPA filters to hot air is 400 F; above this temperature the tensile strength of the media drops sharply, to as little as 50% of the room-temperature tensile strength at 500 F. Fiber fracture and fiber loss occur at temperatures in excess of about 550 F. The limiting temperature of the assembled filter element is actually determined by the sealant used between the casing and the frame and, for wood-cased units, the casing material. Plywood is good for continuous exposure at temperatures up to 300 F for periods up to 48 hours, and up to 200 F for indefinite exposure (i.e.

weeks or months). Steel is good for any temperature within the useful operating range of the media, although damage may be caused by differential expansion between the casing and the filter pack. Volatilization and reduction in shear strength of adhesive limits continuous operating temperatures to 250 350 F for periods up to 48 hours, and 200-275 F for indefinite exposure (according to adhesive used in manufacture). Steel-cased units with special sealants may withstand substantially higher continuous operating temperatures but in most cases are unable to meet the requirements of Underwriter's Laboratories Standard UL-586 for fire and hot (750 F) air. Resistance of the filter element to flexure, vibration damage, 'working' of casing joints, gasket relaxation, and casting damage under abnormal pressure loadings is in large part a function of the mounting frame or fixture in which the filter is installed. Critical aspects of mounting frame and fixture design are structual rigidity, the method of joining individual frame members, and the method of sealing the frame or fixture into the filter housing (all-weld construction and sealing preferred; the tolerances on dimensions, flatness, alignment, and surface finish of gasket seating surfaces, rigidity of filter clamping devices, and uniformity and degree of compression of filter gaskets in the frame or fixture. Recommendations on each of these factors are presented. (Author abstract modified)

10455 APTIC NO. 28286

North American Rockwell Corp., Canoga Park, Calif., Atomics International Div.

DEVELOPMENT OF THE MOLTEN CARBONATE PROCESS TO REMOVE LEAD AND OTHER PARTICULATES FROM SPARK IGNITION ENGINE EXHAUSTS.

Contract CPA 70-3, AI-70-47, 57p., July 8, 1970. 62 refs.

NTIS: PB 194132

The effectiveness of a molten alkali carbonate eutectic in removing lead compounds from gaseous mixtures was investigated. Test results showed that the size of the lead chloride particulates produced in laboratory generation experiments approximated those found in automobile exhaust. Increasing concentrations of lead chloride vapor produced particulates of larger average size. Both impingement of the gas on the molten salt surface and contacting the gas with molten salt wetted-mesh scrubbers were effective lead removal techniques, a finding confirmed by field testing on an automobile with a preliminary molten carbonate device. The lead removal efficiency is a wetted-mesh scrubber increased as the gas residence time in the wetted mesh increased, decreased as the gas velocity through the mesh increased, increased as the melt temperature decreased, and was essentially independent of the lead particulate concentration in the gas stream. The results also indicated that the fraction of lead removed after impingement against a molten salt surface increased as the impingement velocity increased and that removal by impingement is more effective as the temperature decreased. Control of lead emissions by this technique would be a technical and an economically feasible (less than 1 cent/gal) alternate to prohibiting the use of leaded gasoline. Has the added advantage of simultaneously reducing inorganic and organic particulates, sulfur oxide and nitrogen oxide emissions. (Author summary modified)

10456 APTIC NO. 28287

Harris, Margaret E., Valeria R. Rowe, E. B. Cook, and J. Grumer

REDUCTION OF AIR POLLUTANTS FROM GAS BURNER FLAMES. INCLUDING RELATED REACTION KINETICS.

Bureau of Mines, no. 653, 67p., 1970. 81 refs.

The formation of nitrogen oxides, the decay of carbon monoxide, and the concentrations of residual hydrocarbons in the secondary combustion zones of propane-air and methane-air flames were studied in three enclosed burners designed to simulate gas appliances such as space and water heaters. The effect of thermally or chemically perturbing the combustion gases above these flames was determined theoretically and by means of factorial experiments. The concentrations of air pollutants and the flame temperatures were measured, and the effects of ingress of secondary air into the primary and secondary combustion zones, flame stability, burner port surface, and simulated recycling of combustion gases were noted. Based on this study, four principles were derived that, applied to gas appliance design, will insure minimal emissions of these air pollutants. Oxides of nitrogen can best be kept low by depressing peak temperatures to about 3050 F; if this is not possible, then the secondary combustion zone should be cooled rapidly to this temperature; carbon monoxide concentrations can be limited by rapid induction of secondary air; and hydrocarbon concentrations can be controlled by designing for well-seated, stable flames. In addition, empirical reaction rates were derived that predict the concentrations of nitrogen oxides and carbon monoxide in the primary and secondary combustion zones. (Author abstract modified)

10457 APTIC NO. 28293

Muermann, Herbert

MAINTENANCE OF CLEAN AIR IN THE METAL INDUSTRY.

(Fragen der Luftreinhaltung in der Metallindustrie). Text in German. Zbl. Arbeitsmed., no. (2):46-52, Feb. 1971.

Dust collection systems in the metal industry usually comprise an exhauster, a pipe system, and a dust collector. Dust collectors frequently used as cyclones, cloth filters, and wet dust collectors. Construction and installation of cyclones is rather simple. They achieve collection efficiencies between 80 and 98%. Cloth filters operate according to the principle of sifters. Collection efficiencies of more than 99.9% are possible. Cloth filters come in both tubular and envelope form and can be used in single or multi-chamber arrangements. Wet dust collectors are based on the principle of intense contact between dust and water and impaction on the wall of the scrubber.

10458 APTIC NO. 28294

Nikolov, L., I. P. Mukhlenov, and V. M. Pomerantsev

OXIDATION OF SULFUR DIOXIDE AT LOW DEGREES OF TRANSFORMATION.

(Okisleniye sernistogo gaza pri malykh stepenyakh prevrashcheniya). Text in Russian. Zh. Prikl. Khim., 43(10): 2321-2323, Oct. 1970. 4 refs.

Partial (not more than 20%) oxidation of SO2 at atmospheric pressure was studied experimentally at temperatures ranging 420-496 C with the following gas concentrations (%): SO2--2.8-12.5; O2--6.3-20; N2--74-88. SO3 yield was found to be independent of SO2 concentrjation for a fixed oxygen concentration. Hence, reaction rate is determined by the oxygen partial pressure.

10459 APTIC NO. 28298

Yamanaka, Tatsuo

UTILIZATION OF CATALYST IN AIR POLLUTION CONTROL (2).

(Kogaiboshigijutsu ni okeru shokubai no riyo (2)). Text in Japanese. Kagaku Kogyo (Tokyo), 22(3):102-108, March 1971. 7 refs.

The catalytic treatment of nitrogen oxides is discussed together with the role of nitric oxide and nitrous oxides in the formation of photochemical smog and the basic decomposition mechanism of nitrogen oxides. Nitrogen dioxide can be effectively decomposed by chemical treatment but nitrogen oxide or nitrous oxide require a catalytic reduction treatment. The latter is in use in factories but problems remain to be solved before it can adopted for automobiles. Fuel gas used for the catalytic reduction of nitrogen oxides include hydrocarbons, carbon monoxide, hydrogen and ammonia; all but ammonia are used for catalytic treatment of automotive exhaust gas. Fe2O3 has the highest activity in decreasing order of activity as a catalyst for carbon monoxide nitrogen oxides reactions; followed by Cu2O, Cr2O3 and Co3O4. In factories, Pt or Pd are generally used as the catalyst due to their longer service life. Hydrogen gas or gas containing a large amount of hydrogen, has many advantages in the catalytic treatment of nitrogen oxides. These include lower reaction temperature, higher reaction speed, no soot generation, reduction of nitrogen dioxide reduced to nitric oxide, and reduction of nitrogen oxides to 1 ppm. The hydrocarbon fuel method in which the catalyst is either Pd+Pt or Pt requires a higher reaction temperature. The ammonia fuel treatment is economically advantageous in that nitrogen oxides will hardly react with coexisting oxygen, but this time it is only at 300 C or below. Another problem in catalytic reduction of nitrogen oxides is that oxides efficiency drops unless the temperature is kept between 150 C and 250 C. The most effective catalyst for this treatment is Pt, particularly 0.5%Pt-Al2O3 pellets.

10460 APTIC NO. 28299

Kan, Takao and Mitsuo Sato

THE POISONING OF CATALYST DURING THE HYDRODESULFURIZATION OF PETROLEUM RESIDUUM - ESR INFORMATIONS AND RELATED TOPICS.

(Juyu no suisoka datsuryu ni okeru shokubai no hidoku - ESR joho to sono shuhen). Text in Japanese. Nippon Kagaku Zasshi (J. Chem. Soc. Japan), 91(12):1103-1119, Dec. 1970. 42 refs.

Several cobalt-molybdenum catalysts of different composition and supported by different carriers were used to hydrodesulfurize residual Khafji petroleum. The relation between the decrease is desulfurization activity and deposits on the catalysts was obtained by chemical analysis, ESR, and atomic absorption. After a continuous reaction of 50 hrs, carbon, vanadium, and nickel accumulate on the catalyst. The carbon accumulation (8-15 wt% to the catalyst) is inversely proportional to the desulfurizational activity, but the accumulation of vanadium (0.1-0.7 wt%) or nickel (0.05-0.2 wt%) has little effect on the activity. The spin concentration of carbon on the catalyst is almost constant (8-10 times 10 to the 12th power spin per gram carbon) for any catalyst, and the desulfurizational activity depends more on the 'quantity' than the 'quality'. Thirty to eighty percent of vanadium or nickel compounds in the heavy oil are captured on the catalyst. Vanadyl compounds constitute only one to six percent of all vanadium compounds captured. Based on the g-value and coupling constant of ESR, vanadyl porphyrin in the crude oil is first adsorbed on the catalyst and is converted into other vanadium compounds. For a further study of the accumulating mechanism of carbon, vanadium, and nickel on a catalyst, the distribution of these was investigate on a catalyst layer 200 cm long and with an 0.8 cm inner diameter. The distribution, after 50 hrs and 1000 hrs, shows that the accumulation of carbon somewhat increases from inlet to outlet and approaches the 'saturated state' at 50 hrs; the accumulation of vanadium and nickel first decreases then increases with the reaction time. These observations suggest that the accumulation of carbon proceeds 'in series' and that of vanadium and nickel 'in parallel'. In the poisoning of the catalyst, carbon plays an important role in the early period of reaction and vanadium and nickel at the later period.

10461 APTIC NO. 28304

Stephens, Ruth E.

METHOD OF DECOMPOSING NITROGEN OXIDES.

(Ethyl Corp., New York, N. Y.) U. S. Pat. 3,552,913. 2p., Jan. 5, 1971. 2 refs. (Appl. Aug. 31, 1966, 6 claims).

A catalyst is provided capable of rendering oxides of nitrogen less noxious. The exhaust gas of internal combustion engines contains unburned hydrocarbons, carbon monoxide, nitrogen oxides an oxygen, among other materials. Oxides of nitrogen in the presence of sunlight lead to ozone formation, and that ozone reacts with hydrocarbons in the atmosphere to form noxious materials. Noxious nitrogen oxides are decomposed by contacting a neodymium oxide catalyst, usually with a catalyst support. Suitable catalyst supports include alumina, magnesia, zirconia, silica, silica alumina, zinc oxide, zircon, mullite, and kaolin. In the present invention, a catalyst support of zinc oxide is recommended to contain about 0.001 to 25 weight percent of a neodymium catalyst in oxide form.

10462 APTIC NO. 28305

Bartholomew, Roger F. and Harmon M. Garfinkel

METHOD OF REMOVING SULFUR DIOXIDE, NITROGEN DIOXIDE, AND CARBON DIOXIDE FROM GASES.

(Corning Glass Works, Corning, N. Y.) U. S. Pat. 3,552,912. 2p., Jan. 5, 1971. 4 refs. (Appl. Nov. 14, 1969, 3 claims).

Sulfur dioxide is released in the roasting of copper sulfide ores and in the burning of sulfur-containing coals, whereas nitrogen dioxide is expelled in glass manufacturing operations when nitrates are employed as batch materials. A method is described for removing sulfur dioxide and/or nitrogen dioxide and/or carbon dioxide from gaseous mixtures, which comprises contacting the mixture first with a molten nitrate and then with a molten hydroxide. The molten nitrates should be selected from a group consisting of potassium nitrate, silver nitrate, and sodium nitrate; the molten hydroxide should be selected from potassium hydroxide or sodium hydroxide.

10463 APTIC NO. 28306

Blytas, George C.

REMOVING SULFUR DIOXIDE FROM HOT GAS.

(Shell Oil Co., New York,) U. S. Pat. 3,552,921. 4p., Jan. 5, 1971. 4 refs. (Appl. Aug. 28, 1968, 17 claims).

A process for removing sulfur dioxide from hot oxygen-containing gas streams is described. Hot stack gases decompose and vaporize organic materials so that they cannot be used, or at least cannot be used economically, in scrubbing stack gases. In order to employ an organic liquid, it is necessary to cool the entire gas stream to a temperature that can be tolerated by the organic liquid; and after sulfur dioxide is removed, it is necessary to reheat the entire gas stream to restore its buoyancy so that it may rise up a stack and carry into the atmosphere. Problems involved with solid sulfur dioxide acceptors include the difficulty in transporting solid material from reaction zones to regeneration zones, maintaining the capacity of such materials, and the necessity of heating and cooling solids between regenerating and accepting zones. In the present process, the gas containing sulfur dioxide is contacted at a temperature of from about 250 C to 500 C with a molten salt system which consists essentially of potassium sulfate and potassium pyrosulfate. The pyrosulfate-rich salt system is withdrawn from the contacting zone and passed to a regenerating zone where its temperature is raised to at least 600 C, to drive off sulfur trioxide.

10464 APTIC NO. 28307

Wisdom, Francis A.

GAS SCRUBBING APPARATUS.

(Monsanto Co., St. Louis, Mo.) U. S. Pat. 3,552,728. 4p., Jan. 5, 1971. 12 refs. (Appl. Oct. 26, 1966, 5 claims).

An apparatus is presented for scrubbing gases being vented from analytical instruments. A typical solution of the past has been to vent the gases from the analytical instruments into a container of water so that the gases are bubbled through water before reachin the atmosphere in order to remove any harmful and/or noxious fumes. While this method and others have been satisfactory from the standpoint of removal of the undesirable constituents in a gas, they have not proven satisfactory with respect to the effect on the instruments from which the gases are being vented. The present scrubber has a vertical gas conduit and a chamber with a spheroidal exterior surface. A coaxial liquid conduit surrounds a portion of the vertical gas conduit so as to form an annular space between the gas conduit and the liquid conduit. The lower end of the gas conduit is in open communication with the chamber, while the lower end of the liquid conduit is circular and lies in a single horizontal plane and opens in close proximity to the upper surface of the chamber. The spheroidal exterior surface of the chamber has a circular horizontal cross section and is axially aligned with the gas conduit and liquid conduit. The diameter of the circular horizontal cross section varies constantly and uniformly in a nonlinear manner from the top of the chamber to the bottom of the chamber in such a manner as to make the exterior of the chamber widest at a point between the top and the bottom of the chamber. An opening is at the bottom of the chamber, the center of which lies on the common axis of the spheroidal exterior surface of the chamber and the gas and liquid conduits. It is of such size that fluid flowing down the exterior surface of the chamber will come together to form a seal over the opening. (Author abstract modified)

10465 APTIC NO. 28309

Trush, V. I., L. G. Chalyy, and K. Sh. Shuster

DETERMINATION OF PHYSICAL PARAMETERS OF DUST IN THE GAS DISCHARGE DUCT OF AN OPEN-HEARTH FURNACE AND TESTING OF DIFFERENT METHODS OF ITS COAGULATION.

(Opredeleniye fizicheskikh parametrov pyli v gazootvodyashchem trakte martenovskoy pechi i oprobovaniye razlichnykh sposoboyeye koagulyatsii). Text in Russian. Stal, 30(10):956-Oct. 1970.

Dust size in the stack gases of an open hearth furnace averaged 0.1-0.15 micron by count, and 0.2-0.4 microns by weight, and was found to coagulate into irregular particles measuring 0.7-1.5 micron. Magnetization caused no appreciable increase in aggregate size. Sonic treatment at 0.1 watt/sq cm with a power consumption of 1 kw-hr/1000 cu m caused aggregate size to nearly double. A 2 to 5-fold consolidation was affected in 0.01-0.03 sec by applying 0.2 kw-h/1000 cu m in an electric discharge chamber.

10466 APTIC NO. 28312

Kostin, L. P., N. I. Chikishev, A. N. Ketov, and V. V. Pechkovskiy

OXIDATION OF SO_2 IN $NA_2S_2O_7$--FE_2O_3 MELT.

(Okisleniye sernistogo angidrida v rasplave $Na_2S_2O_7$--Fe_2O_3). Text in Russian. Izv. Vysshikh Uchebn Zavedenii Khim. i Khim. Tekhnol., 13(9):1325-1327, 1970. 15 refs.

Catalytic oxidation of SO_2 in an $Na_2S_2O_7$--Fe_2O_3 melt was demonstrated experimentally to be both stable and reversible, and to depend upon the temperature and composition of the melt. Maximum oxidation (45%) was achieved at 680 C with an $Na_2S_2O_7$:Fe_2O_3 ratio of 8:2.

10467 APTIC NO. 28313

Belinskiy, S. Z., Yu. I. Chander, V. A. Konovalova, and Z. G. Palamarchuk

APPLICATION OF ELECTRIC FILTERS FOR CATCHING DUST IN FIRE-BRICK PRODUCTION.

(Primeneniye elektrofil'trov dlya ulavlivaniya pyli v shamotnom proizvodstve). Text in Russian. Stal, 30(10):956, Oct. 1970.

UG electrostatic precipitators are recommended for the removal of grog dust when flow rates exceed 1 m/sec. When dust content exceeds 15-20 g/cu m preliminary mechanical removal is required. Treatment with deaerated water, steam, or chemical additives is also necessary so as to reduce the electrical resistance of the grog dust to an optimum value of 100-10,000 megohm-cm.

10468 APTIC NO. 28314

Karpukhovich, D. T.

THE EFFECT OF DUST ON THE FLOW DENSITY AND HYDRAULIC RESISTANCE IN CYCLONES.

(Vliyaniya zapylennosti na plotnost' gazovogo potoka i gidravlicheskoye soprotivleniye tsiklona). Text in Russian. Khim. Prom. (Moscow), 46(12):916-918, Dec. 1970. 5 refs.

The effect of coal dust (about 50% of the particles less than 50 micron) on cyclone flow with dust content ranging from 0 to 0.5 kg/cu m was studied experimentally at 18 C and 757 mm Hg (cyclone diameter, 300 mm; efficiency, 97-98%). The coefficient of resistance of the cyclone dropped significantly (about 27%) as dust content was increased to 0.16 kg/cu m. A further increase in dust content showed a much less marked effect. An empirical formula describing this relationship is given. These findings were confirmed on a TsN-11 industrial cyclone (diameter, 550 mm; flow rate, 10,000 cu m/hr; dust content, 0.77 kh/cu m; temperature, 71 C; efficiency, 98.5%).

10469 APTIC NO. 28315

Gradus, L. Ya., A. A. Rusanov, and S. S. Yankovskiy

DUST EXHAUSTS IN THE PRODUCTION OF CALCIUM CARBIDE.

(Pylevyye vybrosy v proizvodstve karbida kal'tsiya). Text in Russian. Khim. Prom (Moscow), 46(12):918-920, Dec. 1970. 5 refs.

Particle size distributions of dust exhaust from 5 different calciu carbide plants are tabulated. Mean particle size ranged from 3.5 to 12 micron and was found to increase with plant power consumption. This is attributed to increased oven temperature. The proportion of particles smaller than 5 micron increases as plant productivity increases, but decreases with increasing dust concentration.

10470 APTIC NO. 28316

Mastikhin, V. M., G. M. Polyakov, Ya. Zyulkovski, and G. K. Boreskov

AN ESR INVESTIGATION OF VANADIUM CATALYSTS FOR OXIDATION OF SULFUR DIOXIDE.

(Issledovaniye vanadiyevykh katalizatorov okisleniya dvuokisi sery metodom ESR). Text in Russian. Kinetika i Kataliz, 11(6):1463-1468, 1970. 7 refs.

Electronic spin resonance studies of vanadium catalysis made directly during oxidation of SO_2 at 400-500 C are reported. Spectr were taken with gas mixtures corresponding to 95 and 30% conversion of the starting gas. It was established that under these reaction conditions a liquid phase is present in the specimen, and that as temperature is decreased an isolated line emerges in the spectrum as the result either of separation of a solid phase from the melt, or the formation of vanadium ion associations. A break occurring in the Arrhenius curve is associated with this phenomenon. Differences in the spectra of specimens with different active-film thicknesses are accounted for by different rates of diffusion of components of the reaction mixture.

10471 APTIC NO. 28317

Boreskov, G. K., T. M. Yur'yeva, and A. S. Sergeyeva

THE MECHANISM OF CARBON MONOXIDE CONVERSION ON IRON-CHROMIUM CATALYST.

(Mekhanizm reaktsii konversii okisi ugleroda na zhelezokhromovom katalizatore). Text in Russian. Kinetika i Kataliz, 11(6):1476-1479, 1970. 7 refs.

It was demonstrated experimentally that the surface of an iron-chromium catalyst is reduced by carbon monoxide, and oxidized by water. The rates of these processes vary with the distance of oxygen from the surface, and, in the steady state, coincide with the rate of CO conversion (within the limits of experimental error). It is concluded that the CO conversion on an iron-chromium catalyst involves alternate oxidation and reduction of the catalyst surface. Reaction rates were measured at 320 C with CO and water vapor partial pressures of 4.5 mm Hg.

10472 APTIC NO. 28318

Kovalev, G. I., Yu. B. Kagan, and A. V. Krylova

THE INFLUENCE OF OXYGEN ON CHARGED FORMS OF CHEMISORBED HYDROGEN ON IRON CATALYSTS FOR SYNTHESIS OF ALCOHOLS FROM CARBON MONOXIDE AND HYDROGEN.

(Vliyaniye kisloroda na zaryazhennyye formy khemosorbtsii vodoroda na zheleznykh katalizatorakh sinteza spirtov iz okisi ugleroda i vodoroda). Text in Russian. Kinetika i Kataliz, 11(6):1505-1508, 1970. 5 refs.

It was demonstrated experimentally that oxygen adsorbed onto the surface of an iron catalyst reduces the rate of adsorption, and quantity of hydrogen chemosorbed in the negatively-charged form during type A adsorption (at-30 C), whereas during type B adsorption (at 180 C) the rate of adsorption of hydrogen in the positvely-charged form increases. Kinetic changes in catalyst electron work function, and the effect of oxygen on work function values are plotted.

10473 APTIC NO. 28320

FILTER PROGRAM.

(Filterprogramm). Text in German. Wasser Luft Betrieb, 15(1):36-39, Jan. 1971.

Various types of filters for cleaning waste gases are described. Gases escaping from electrolytic cells used in the melting of aluminum are cleaned by passing them through an aluminum oxide layer where the gaseous fluorides are absorbed. Next the gases are passed through envelope-type cloth filters which retain the aluminum oxide particles. The aluminum oxide is returned to the reduction cells, the fluorides to the melting zone. The process is a dry one which has the advantage of not converting an air-pollution problem to a water pollution problem. A new wet dust collector consists of a high-capacity precipitator, 1200 mm high and 3000 mm long packed with synthetic material. Collection efficiency is about 99.4%. Water consumption is to 0.1 to 0.2 liters/cu m waste air. A filter for radioactive, pathogenic, and toxic substances consists of a rim board with O grooves and a plastic sack that allows contamination-free replacement of the air filter. In a metallurgical plant, the dust-laden waste gases are conducted through water-cooled pipes to a scrubber, where the gases are washed with water. The scrubbing water circulates in a closed system to avoid water pollution.

10474 APTIC NO. 28328

Umezawa, M. and Osamu Shimura

TREATMENT OF SULFUR DIOXIDE IN STACK GAS.

(Shisshiki haien datsuryusochi no tekiyoshiken). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):189, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 10th, 1970.)

Experiments were conducted to determine whether wet desulfurization methods are applicable to the paper manufacturing plants to be constructed in the Fuji area. There will be about 200 plants using about 2700 kl/day heavy oil. The two desulfurization methods tested were the Shinko-type gas absorption and the multipore-plate waste-gas desulfurization systems. The items tested were sulfur dioxide concentration at the entrance and exit of the systems, rate of desulfurization, volume of gas treatment, gas temperature at entrance and exit, volume of treatment water, carbon dioxide and oxygen concentration at the exit, and pressure loss. The experiments were conducted on the assumption that alkaline water-water could be used for treatment, but water of general alkaline quality could not be obtained. Also, there was some corrosion of equipment.

10475 APTIC NO. 28339

Tokyo Metropolitan Public Nuisance Research Inst. (Japan)

ENVIRONMENT CONSERVATION IN THE UNITED STATES: REPORT OF THE TOKYO-NEW YORK SYMPOSIUM ON PUBLIC NUISANCE.

(Amerika ni okeru kankyoshozen. Tokyo-to-New York-shi kogai shinpojumu hokokusho). Text in Japanese. 142p., Aug. 1970.

A review is presented of the topics covered at the Tokyo-New York Public Nuisance Symposium, held in New York from April 9 to April 20, 1970. Included are brief comments by participants on the socio-economic problems now confronting major cities throughout the world, solid waste disposal in New York, air pollution in American cities, water pollution in New

York, and noise pollution in New York and Chicago. The section on air pollution notes the extent of awareness of the American public regarding air pollution, as indicated for example, by The Environmental Handbook published for the Earth Day activities. The Los Angeles Air Pollution Control District and its relationship to air pollution in California is described, and factors contributing to the formation of photochemical smog are explained. Air quality standards established by New York City are given, along with a detailed description of air pollution control activities. Comparative data are presented for levels of pollution in Tokyo and New York by sulfur dioxide, carbon monoxide, and suspended particulates. A short description of efforts to control air pollution in Chicago is also given.

10476 APTIC NO. 28341

Stichlmair, J. and A. Mersmann

THE ADIABATIC ABSORPTION.

(Die adiabate Absorption). Text in German. Chem. Ing. Tech., 43(1, 2):17-23, 1971. 9 refs. (Presented at the Verein Deutscher Ingenieure, Verfahrenstechnische Gesellschaft Session, Bensheim-Auerbach, West Germany, May 21, 1970.)

Absorption experiments were conducted in a column with 11 perforated plates. Distilled water was used as scrubbing agent and nitrogen enriched air as carrier gas. Ammonia, methanol, and hydrogen chloride were absorbed. The carrier gas quantity was 0.61 kmol/hr and the gas speed was 0.3 m/sec. The pressure loss in the column was 3 torr per plate because of the installation of plates for the droplet precipitation. The concentration of ammonia and hydrogen chloride in the gas and the liquid was determined by titration. A decameter was used for the analysis of methanol in the liquid. At non-isothermal scrubbing, large deviations from the model concept i.e., the temperature rises only on the lowermost plates occurred. The assumption that saturation of the gas with scrubbing fluid causes a temperature drop in the column is not always true. The temperatures may rise through internal heat transfer. The gas may store so much heat and give it up again that the temperature of the fluid is changed. If the heat capacity of the fluid is much larger than that of the gas, the model concept holds. If the heat capacity of the gas is larger than that of the fluid, a uniform temperature spreads over plates. The gas receives absorption heat on the lower plates and flows through the column. If gas and liquid have the same heat capacity, the temperatures of both phases may rise significantly. In this case, it is advisable to install a cooler in the column.

10477 APTIC NO. 28359

Schwieger, R. G.

AIR AND WATER POLLUTION BY POWER PRODUCTION, ITS EXTENT AND CONTROL MEASURES.

(Luft- und Wasserverunreinigung durch die Energieerzeugung, ihr Umfang und ihre Bekaempfung). Text in German. Energie (Munich), 23(1):17-20, Jan. 1971.

Of the total quantity of dust emitted by combustion in stationary plants, 10% comes from coal-fired power plants and less than 0.4% from oil-fired plants. The extent of the emission in each case depends on the ash content of the fuel, the firing systems, and the efficiency of the flue gas cleaning system. For gas-fired systems, the dust emission is negligible. Electrostatic precipitators have a dust collection efficiency of more than 99%. Little is being done to reduce sulfur dioxide emissions from power plants. In 1967, 42.7% of the SO2 emissions came from coal-fired power plants. Oil-fired plants contributed to 3.3%. The most efficient method of reducing SO2 emissions is the use of low-sulfur fuels. Other possibilities for reduction of the SO2 emissions are desulfurization of coal, which is only feasible when the sulfur is present in the form of pyrite, the use of high stacks, and switching to nuclear or water power. Some methods for the desulfurization of waste gases are not satisfactory yet. They operate with alkalized clay, injection of potassium carbonate, or with catalytic oxidation. Nitric oxides also emitted by power plants at rates of 25% of the total emissions are removed by scrubbing, catalytic oxidation, and absorption.

10478 APTIC NO. 28377

Middleton, John T.

PLANNING AGAINST AIR POLLUTION.

Am. Scientist, 59(2):188-194, March-April 1971.

Major sources of air pollution and methods used for its measurement and control are summarized. The automobile accounts for more than half the hydrocarbons, nearly half the nitrogen oxides, and two-thirds of the carbon monoxide that are released into the air of the United States each year. It is also the chief source of lead in the atmosphere. Some hydrocarbons are toxic in themselves, and other participate in a series of reactions with the oxides of nitrogen to form'oxidants'. These products cause eye irritation, allergenic responses, reduced work performance, depressed mitochondrial activity, and destructive effects on vegetation, polymers, and other materials. Pollution control standards for the elimination of automobile emissions are indicated, as well as the efforts of the Clean Air Act of 1967 and its amendments to reduce emissions from stationary sources. The sulfur oxide problem is discussed, and energy-producing techniques are mentioned. By itself, undifferentiated particulate pollution--from parricles under 500 micron in diameter--can injure surfaces within the respiratory system and affect climate, visibility, building materials, textile fibers, and vegetation. Effects of pollution on the weather and the role of meteorological conditions to produce photoehemical smog are reviewed. Simulation modeling is discussed, as well as a zoning plan under study in Chicago, and the broader role of the scientist.

10479 APTIC NO. 28384

Beck, Kurt-Guenther and Wilhelm Weskamp

THE INCREASE OF PRODUCTIVITY OF COKE OVEN GROUPS THROUGH HIGHER OPERATING TEMPERATURES.

(Steigerung der Produktivitaet von Koksofengruppen durch hoehere Betriebstemperaturen). Text in German. Glueckauf (Essen), 107(2):43-51, Jan. 1971. 8 refs. (Presented at the Informationstagung 'Technik und Entwicklung der Veekogung von Steinkohle' der Kommission der Europaeischen Gemeinschaften, Luxemburg, Belgium, April 1970.)

In an experimental coking plant, coals with 20 to 30% volatiles were coked at 1350 to 1500 C. Increasing the temperature from 1350 to about 1490 C reduced the coking time from 14 to 11 hrs and increased the throughput from 24.7 to 34.5 tons/24 hrs. This is a throughput increase of 27.5%. The waste gases produced in the 450-mm wide combustion chambers contained between 7.4 and 8.4% carbon dioxide, depending on the temperature in the combustion chamber and between 2.9 and 3.2 oxygen. Temperatures of the waste gases ranged from 229 C at a combustion temperature of 1348 C to 246 C at a combustion temperature of 1360 C. Waste gases with temperatures between 308 C at a combustion temperature of 1343 C and 339 C at a combustion temperature of 1480 C were measured. The quantity of waste gas produced at an air surplus at n equals

1.2 was 38,988 cu m/24 hrs at 1343 C and 56,520 cu m/24 hrs at a combustion temperature of 1480 C.

10480 APTIC NO. 28392

Bauer, Hans-Dieter and Hans-Guido Klinkner

THE EFFICIENCY OF SURFACE ACTIVE SUBSTANCES IN WET DUST SUPPRESSION AT A COAL BAGGER.

(Die Wirksamkeit oberflaechenaktiver Stoffe bei der nassen Staubbekaempfung an Walzenschraemladern). Text in German. Glueckauf (Essen), 107(5):161-169, March 4, 1971. 13 refs.

Experiments were carried out on a coal bagger with wet dust suppression. The efficiency of dust suppression with and without a wetting agent in the water was tested. The wetting agent Lessageene Z 100 was added in quantities of about 0.08%. Dust supression was clearly improved by use of the wetting agent and a spraying speed of 100 l/min. Far more dust was suppressed under these conditions than by double spraying the amount of water, i.e., 200 l/min without the wetting agent. This applied to the entire range of grain sizes of dust particles, fine as well as coarse.

10481 APTIC NO. 28395

Malinsky, Jan

CATALYTIC COMBUSTION OF METHANE.

(Katalytische Verbrennung von Methan). Text in German. Erdoel Kohle (Hamburg), 24(2):82-85, Feb. 1971. 30 refs.

A simple micro-reactor was used to determine the activity of metal oxides in the catalytic combustion of methane. The conversion rate of the reaction CH4 plus 2O2 equals 2H2O plus CO2 was below 1%. The small concentration of carbon dioxide in the reaction products was determined by an infrared analyzer. Catalytic activity was measured for oxides of cobalt, chromium, copper, manganese, and iron. The oxides were produced partly by precipitation from water solutions and partly by impregnation on gamma-aluminum oxide. A low thermal stability was found for CuO and MnO2. At 530 C, the latter is converted to Mn2O2, which has a lower activity. Of all the oxides studied, Cr2 and Co3O4 are the most stable. These findings have implications for the catalytic afterburning of hydrocarbons in industrial waste gases and for the catalytic combustion of hydrocarbons that occur, together with carbon monoxid in automobile exhausts.

10482 APTIC NO. 28401

Mal'gin, A. D. and I. V. Kukushkin

OPERATIONAL CHARACTERISTICS AND SELECTION OF CYCLONES OF THE NIIOGAZ (STATE RESEARCH INSTITUTE FOR INDUSTRIAL AND SANITARY PURIFICATION OF GASES).

(Ekspluatatsionnyye kharakteristiki i vybor tsiklonov NIIOGAZ). Text in Russian. Vodosnabzh. i Sanit. Tekhn., no. 11:21-24, 1970. 2 refs.

Testing of various cyclones has established that minimum operating cost is achieved with TsN-11 and SDK-TsN-33 units; the TsN-15 is suited for small-scale operation where the dust involved tends to self-adhere; conical cyclones SDK-TsN-33 and SK-TsN-34 are larger and heavier than other types of comparable capacity, thus limiting their use for multiple-unit installations; the TsN-24 is suitable for removal of coarse dust (25 Micron or larger), or for preliminary dust removal in combination with other equipment; and the Ts-15U is suited for use only where strict limitations on unit height are imposed. Operating characteristics of these units are tabulated; performance of the TsN-11 is used for reference values.

10483 APTIC NO. 28402

FUMELESS REFINING BY OXIDE INJECTION.

Brit. Steelmaker, 36(12): 14-15, Dec. 1970.

The Steel Castings Research and Trade Association, Sheffield, has developed a fumeless process by which steel is decarburized by injecting iron oxide powder directly into the bath. The oxide promotes a vigorous carbon boil but there is no emission of brown fume. Any kind of iron oxide can be used, or the oxide of an alloying metal, while the carrier gas used is normally compressed air. The reaction is endothermic, but adjustment of heat input during injection makes it possible to control the temperature. (Author abstract)

10484 APTIC NO. 28405

Ikuo, Yorioka

TWO-STAGE ELECTRIC DUST COLLECTOR.

(Nidanshiki denki shujinki). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 45-31518. 10p., Oct. 12, 1970. 2 refs. (Appl. Aug. 11, 1965, claims not given).

The remodelling of the discharge and dust collecting parts of a two-stage electric dust collector is presented. In the discharge part, as little dust as possible is collected; instead, only discharging and charging of dust are carried out. Most of the dust collection is done in the dust collecting part, thus improving the efficiency of the dust collector and reducing manufacturing and operating costs. There were defects in a Cottrell type electric dust collector: dusts with low electric specific resistance (less than 10,000 omega for carbon black) would drop off and fly about instead of adhering to the collecting electrode; and dust with high electric specific resistance (over 5 times 10 omega cm) would exhibit the reverse corona phenomena, forming a layer on the collecting electrode and thus lowering dust collecting efficiency. Expensive humidifiers were necessary to lower electric specific resistance. The rapping device further dislodged the dust. To make rapping of dust effective, the gap between the discharge and dust collecting electrodes had to be enlarged, increasing the size of the dust collector and the voltage between electrodes. The new invention avoids these defects. The device is for industrial use, so that the generation of ozone and nitrogen oxides is not a problem, as in the case of dust collectors for air purification. Discharge efficiency is improved by providing electrode needles which form a network, and in the center of which opposed electrode needles are placed. In the rear of the discharge section there is a rotating dust collecting chamber with a wind outlet at its rear and a hopper at the bottom. In the dust collection chamber there is a group of discs, each covered with a semiconductor and connected to a common rotating axle. A slip ring is provided on the axle so that the discs can in turn be positively or negatively impressed. The dust collected on the discs is removed by a scraping board and dropped into the hopper.

10485 APTIC NO. 28406

Hara, Haruichi, Osamu Kaieda, and Toshihide Kanzaki

A NEW MANUFACTURING METHOD OF CATALYST FOR CHANGING EXHAUST GAS.

(Haiki gasu henkanyo shokubai no seizo hoho). Text in Japanese. (Japan Catalytic Chemical Industry Co., Ltd., Osaka) Japan. Pat. Sho 45-28897. 5p., Sept. 21, 1970. 2 refs. (Appl. April 8, 1966, claims not given).

A method is presented of manufacturing a catalyst for treating exhaust gases containing unburned or imperfectly burned hydrocarbons, especially for oxidizing hydrocarbons and carbon monoxide in the exhaust gas of internal combustion engines. Devices such as afterburners, or design modifications, are expensive, and have the limitation that some part of the gas is emitted into the atmosphere. Passing the exhaust gas through a reactor filled with a catalyst is economically advantageous, the reactor can act as a silencer as well. The catalyst obtained from aluminum hydroxide and a mixture of manganese oxide and copper oxide is active and very cheap. Through the addition of Fe2Os.H2O, which constitutes 10-30% in weight of the completed catalyst (ideally, 15-25%) and manganese and copper oxide, 5-30% in weight of completed catalyst (ideally, 15-25%), the new catalyst is more highly activated than any known catalyst. If necessary, a small quantity of metal other than iron, copper and manganese can be added to increase the effect. All of the components, in fine powder form, are mixed and molded into pellets.

10486 APTIC NO. 28410

George, Ralph E. and Robert L. Chass

CONTROL OF CONTAMINANT EMISSIONS FROM FOSSIL FUEL-FIRED BOILERS.

J. Air Pollution Conrol Assoc., 17(6):392-395, June 1967. 6 refs.

Air pollution problems from fuel combustion are examined in terms of three major contaminant groups--sulfur oxides, nitrogen oxides, and particulate matter. As shown by comparative statistics for New York and Los Angeles, the problem of air pollution from fuel combustion is solvable by fuel substitution. In Los Angeles, where fuel requirements have been increasingly met by natural gas, reductions in the three major contaminants amount to nearly 500 tons/day. The switch to natural gas is the result of a rule that prohibits the burning of fuel oils containing more than 0.5% sulfur, or gaseous fuels with more than 50 grains of sulfur/100 cu ft of gas from April 15th to November 15. For all practical purposes, the only fuel now burned in Los Angeles is that burned by power plants and refineries when natural gas supplies are curtailed to these consumers from November 16 to April 14. When fuel oil is burned by the Southern California Edison Company, particulate emissions are expected to be controlled by a bag filter house now under development. Experimental work is also being done on a two-stage combustion method to reduce the formation of nitrogen oxides when either oil or natural gas is used.

10487 APTIC NO. 28415

Waeser, Bruno

PRODUCTION OF SULFUR FROM SULFUR DIOXIDE, FROM SMELTING PLANT WASTE GAS AND FROM FLUE GAS.

(Gewinnung von Schwefel aus Schwefeldioxyd, Huettenabgasen und Rauchgas). Text in German. In: Handbuch der Schwefelsaeurefabrikation). F. Vieweg (ed.), vol. 1, 1930, p. 118-123. 24 refs.

The oldest (1833) SO2-reduction method passed waste gas over glowing coal or coke but was not very successful. The Thiogen method of the Pennsylvania Mfg. Co. reduces SO2 from flue gas to S by atomized mineral oil in the presence of an iron oxide catalyst. M. Ruthenberg's method reduces SO2 by coal suspended in acid, while another method uses an electrically heated column of coke for the reduction of SO2.P.S. Smith's technique reduces SO2 in a mixture of water gas and generator gas. In Basset's method, dust-free gas is passed through a tower filled with glowing coke; the mixture of CO2 and COS obtained is reduced to elementary S by excess CO2 in a second tower. Hellsing's method reduces SO2 by H2S. Many modifications, among them the method of the American Smelting and Refining Co., use glowing coke to achieve reduction of SO2 to S. A method developed by the Comp. Generale des Prod. Chim. de Louvres passes a mixture of H2S and SO2 over heated zinc sulfate. The Renania method converts H2S and SO2 mixes to sulfur, thiosulfate, and sulfhydrate by alkaline and sulfhydrate lye or by alkali sulfides. Riedel's method reduces roasting as in oil or in coal dust chambers with or without air. Wochler, Martin, Schmidt and others developed a number of methods based on the reduction of SO2 by zinc, calcium, and by iron sulfide. Wilbaut and La Bastide reduce SO2 by amorphous coal at 800 C to sulfur with a 99% yield. Indirectly, SO2 from waste and flue gases is processed by ammonia to sulfite and other compounds. Of special interest are processes which convert SO2 and H2S to colloidal sulfur.

10488 APTIC NO. 28453

(Inventor not given.)

METHOD OF OBTAINING ELEMENTAL SULFUR FROM GASES CONTAINING SULFUR DIOXIDE.

(Fremgangsmate for utvinning av elementaert svovel av sveveldioksydholdige gasser). Text in Norwegian. (Metallgesellschaft, A. G., Frankfurt am Main, (West Germany)) Norw Pat. 63,291. 2p., March 3, 1941. (Appl. Dec. 31, 1938, 1 claim).

Sulfur is obtained from the SO2 vapors by reduction with materials containing carbon at a high temperature, such as 400-800 C, in the presence of a catalyst. The characteristic feature of the invention is that the gases containing SO2 are dried before their introduction into the reduction furnace. An experimental example illustrates that the preliminary drying of the gases results in the saving of 130 kg of coke in the production of 1000 kg of elemental sulfur.

10489 APTIC NO. 28454

Kurochkin, A. I., M. N. Zharova, A. P. Kashyrichev, Ye. V. Kolodiyeva, Z. F. Chukhanov, and Ye. I. Kazakov.

POWER-ENGINEERING USE OF SULFUROUS AND HIGHLY-SULFUROUS MAZUT.

(Energotekhnologicheskoye ispol'zovaniye sernistykh i vysokosernistykh mazutov). Text in Russian. Izv. Akad. Nauk SSSR, Energ. Transp., no. 1:85-93, Jan.-Feb. 1970. 3 refs.

Pyrolytic treatment of mazut with high sulfur content yielded a 20% savings in boiler fuel consumption and a significant reduction in cost. The pyrolysis arrangement described yields approximately a 70% desulfurization with by-product yields of 17.5 wt% ethylene, and 6.1% monocyclic aromatic compounds (3.5% benzene, 2.1% touluene), or 13.5 wt% ethylene and 7.8% monocyclic aromatics (6.0% benzene). Optimum benzene yield reached 31.8 kg/ton, with a total yield of C6-C8 aromatic hydrocarbons of 41.3 kg/ton.

10490 APTIC NO. 28456

Ganz, S. N., I. Ye. Kuznetsov, V. A. Shlifer, and L. I. Leykin

REMOVAL OF NITROGEN OXIDES, SULFUR DIOXIDE, AND SULFURIC ACID MIST AND SPRAY FROM

WASTE GASES USING PEAT-ALKALI ABSORBENTS UNDER PLANT CONDITIONS.

(Ochistka vykhlopnykh gazov ot okislov azota, sernistogo gaza, tumana i bryzg sernoy kisloty torfoshchelochnymi sorbentami v zavodskikh usloviyakh). Text in Russian. Zh. Prikl. Khim., 41(4):720-725, 1968. 1 ref.

Studies with a full-scale, three-stage fluidized bed scrubber showed ammonia to be the most effective additive for use with peat as an absorbent in the removal of nitrogen oxide (0.35%, sulfur dioxide (0.3%), and sulfuric acid mist and spray (0.20-0.30 g/cu m) from exhaust gases at 40-50 C. This process yields an effective organomineral fertilizer. Total bed height ranged from 900 to 1150 mm; after 40-50 minutes of operation, the nitrogen oxide concentration was reduced to 0.04-0.05%, sulfur dioxide to 0.01-0.015%, and sulfuric acid to below detectable levels.

10491 APTIC NO. 28463

Bettelheim, Jan, Rostislav Klimecek, Miroslav Strnad, and Frantisek Chlumsky

ABSORPTION OF SULPHUR DIOXIDE IN AN UNPACKED COLUMN WITH JETS.

(Absorpce klyslicniku siriciteho ve vezi s tryskami bez vyplne). Text in Czech. Chem. Prumysl (Prague), 10(35):281-284, 1960. 7 refs.

Experimental and theoretical studies were conducted of the absorption of sulfur dioxide with production of sulfuric acid from waste gases containing about 0.3 vol % SO2 and approximately 0.03 vol % SO3 in unpacked towers equipped with jets. The gases were absorbed in a solution of ammonium bisulfite and sodium bisulfite. The experimental results and a derived equation defining the influence of gas velocity on absorption, suggest that the diffusion resistance of the liquid stationary film can be neglected in the case of the absorption of SO2 in an unpacked column with jets. This does not apply to concentrated solutions because other components of the system, i.e., ammonia and steam, are desorbed.

10492 APTIC NO. 28469

Meacham, G. B. Kirby

VARIABLE CAM TIMING AS AN EMISSION CONTROL TOOL.

Preprint, Society of Automotive Engineers, Inc., New York, 16p., 1970. 4 refs. (Presented at the Society of Automotive Engineers, National West Coast Meeting, Los Angeles, Calif., Aug. 24-27, 1970, Paper 700673.)

Automatic variation of internal combustion engine valve timing in response to load and speed is an effective technique for reducing emission of nitrogen oxides and unburned hydrocarbons. The variation employed is cam advance, which causes part of the exhaust gases normally expelled near the end of the exhaust stroke to be retained and mixed with the fresh air-fuel mixture during the following inlet stroke. Part of the unburned hydrocarbons normally emitted are contained in these recirculated end-of-stroke gases, and are oxidized further by re-exposure to combustion. The peak flame temperature is reduced by the diluent, and formation of oxides of nitrogen is suppressed. A prototype vehicle equipped with an automatic cam advance system shows that emissions measured by the Federal Test Procedure are reduced by the following amounts: nitric oxide 64%, unburned hydrocarbons 32%, and carbon monoxide 16.5%. Only minimal changes in vehicle operating characteristics are caused, and potential durability is good, since the existing engine valves and pistons are used to handle the recirculated exhaust. The cylinder-to-cylinder distribution of the diluent is inherently uniform, and the amount of recirculation is repeatable. (Author abstract)

10493 APTIC NO. 28473

Quick, S. L. and G. D. Kittredge

CONTROL OF VEHICULAR AIR POLLUTION THROUGH MODIFICATIONS TO CONVENTIONAL POWERPLANTS AND THEIR FUELS.

Preprint, International Union of Air Pollution Prevention Associations, 42p., 1970. 22 refs. (Presented at the International Clean Air Congress, 2nd, Washington, D. C., 1970, Paper EN-10B.)

Recent research and development projects for automotive emissions control sponsored by the National Air Pollution Control Administration are briefly surveyed. These projects, which supplement and encourage parallel activities within the automotive and petroleum industries, are intended to lead to demonstration prototypes of emission control systems that can serve as the bases for estimates of technical and economic feasibility of achieving specific emission levels. Techniques reviewed are exhaust system devices (exhaust manifold reactors and catalytic reactors), induction system improvements, particulate control devices (chemica scrubbers, sonic agglomeration, and thermal precipitation), alternate fuels (LP-Gas and natural gas, methanol, and hydrogen), and fuel modification and additivies. With the probable advent of new legislation that will assign NAPCA the responsibility for standards applying to aircraft, vessels, and railroad equipment, it may be expected that greater emphasis in future programs will be placed on development of technology applicable to these systems. Moreover, the responsibility for NAPCA certification of used-car- type emission control systems will require research emphasis on more effective low-cost systems for this application. Consequently less emphasis will be placed on development of candidate emissions control systems for light duty highway vehicles. (Author conclusions modified)

10494 APTIC NO. 28486

Nakagawa, Shikazo

RECOVERY AND UTILIZATION OF SULFUR DIOXIDE IN WASTE GASES BY JECCO PROCESS.

(JECCO ho niyoru haienchuno aryusan gasu no jogai, kaishu to riyo). Text in Japanese. Ryusan (J. Sulfuric Acid Assoc. Japan), 16(10):211-218, Oct. 1963.

Two leading methods of flue gas desulfurization are reviewed and their economic aspects compared. The ammonium sulfite method, developed by the Government Chemical Industrial Research Institute, Tokyo, removes 95% of sulfur dioxide and sulfur trioxide in flue gas by ammonium sulfite solution, which is subsequently oxidized to ammonium sulfate. The recovered ammonium sulfate is neutralized by 98% sulfuric acid. Because of the heat of neutralization, crystalline ammonium sulfate is obtained without using fuel for vaporization. The Jecco process, on the other hand, employs lime, which is abundant in Japan, to remove SO2 in flue gas as gypsum. Since the flue gas contains solid particulates as fly ash, and the gas temperature is too high to be processed in the absorption tower a washing-cooling tower is employed before the absorption tower. The calcium sulfate solution obtained at the absorption tower is condensed and subsequently led to an oxidation chamber, where minut air bubbles provide the most favorable environment for the gypsum crystal growth. Crystals obtained by the method are 450-100 micron in the long axis and 80-40 micron in the short axis. When calcinated to CaSO4.1/2H2O, a

tensile strength of 13 kg/cm2 is attained. This process is currently employed for desulfurizing flue gas from a tunnel kiln burning heavy oil. Since the recovered gypsum has a wide application as a setting modifier of cement, and the effective desulfurization allows the use of inexpensive fuels, the process is concluded to have wide applications in industry.

10495 APTIC NO. 28488

Rao, K. R.

ELECTROGASDYNAMICS--ENERGY OF THE FUTURE½ Preprint, Inst. of Electrical and Electronics Engineers, Cocoa Beach, Fla., Canaveral Section, 6p., 1968. 13 refs. (Presented at the Institute of Electrical and Electronics Engineers Convention, 7th Annual, Cocoa Beach, Fla., Nov. 18-20, 1968.)

The state of the art, limitations, and applications of electrogasdynamic (EGD) energy conversion are discussed. The EGD process involves only the heat-dynamic-electric principle, eliminating the mechanical and magnetic links that are characteristic of conventional power-generating schemes. The fluid dynamic energy of a gas, by transporting unipolar charges against retarding electric field, is transformed directly into electrical energy. Though additional research is required to solve a number of critical problems affecting the performance of EGD generators, the practical development of central EGD power plants using nuclear reactors or fossil fuels does not appear to be formidable. Other applications envisaged for EGD devices include industrial precipitators, dust monitoring and automotive and diesel exhaust emission control.

10496 APTIC NO. 28491

Elshout, A. J. and H. van Duuren

ELECTRIC POWER PRODUCTION AND AIR POLLUTION: A PROJECTION FOR THE COMING DECADE.

(Elektriciteitsproduktie en luchtverontreiniging:Ee verwachting voor de komende jaren). Text in Dutch. Electro-Techniek (The Hague), 47(16):377-380, 1969. 7 refs.

The combustion of coal and oil in power plants is a major source of sulfur dioxide emissions. In addition, nitrogen oxides, fly ash, and soot are produced. On the basis of the rising electricity demand and predictions of consumption of coal, oil, and natural gas by Dutch power stations in the next 10 years, future power station emissions are projected. A decrease in the total emission of air pollutants is noted to be a potential result of the continuing use of natural gas by Dutch power stations.

10497 APTIC NO. 28495

Robison, J. A.

HUMIDITY EFFECTS ON ENGINE NITRIC OXIDE EMISSIONS AT STEADY-STATE CONDITIONS.

Preprint, Society of Automotive Engineers, Inc., New York, 8p., 1970. 5 refs. (Presented at the Society of Automotive Engineers, Mid-Year Meeting, Detroit, Mich., May 18-22, 1970, Paper 700467.)

Investigations of automotive hardware and engine adjustments to reduce the mass of nitric oxide emitted into the atmosphere are continuing at an accelerated pace. However, reproducibility of NO data has proven to be difficult because of the extreme sensitivity of NO concentrations to small variations in test conditions, particularly ambient humidity. The effect of humidity change on engine NO emission during operation on the engine dynamometer was a function of air-fuel ratio, observed NO concentration level, and observed humidity level. Equations and graphs were drived to adjust NO concentrations from one humidity level to another; adjustments in NO concentration varied from 2 to 9 ppm per grain moisture change in absolute humidity. Humidity had a small effect on the combustion rate and on best power spark timing. Operation at increased humidity required greater spark advance. (Author conclusions modified)

10498 APTIC NO. 28497

Venturini, J. L.

OPERATING EXPERIENCE WITH A LARGE BAGHOUSE IN THE ELECTRIC ARC FURNACE STEELMAKING SHOP AT BETHLEHEM STEEL CORPORATION'S LOS ANGELES PLANT.

Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 28p., 1970. 2 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 63rd, St. Louis, Mo., June 14-18, 1970, Paper 70-28.)

One of the largest and most expensive control systems designed to treat all the emissions from three electric arc furnaces was installed at the Bethlehem Steel Corporation's Los Angeles plant and placed in operation early in 1965. The exhaust system consists of a direct roof evacuation type of water-cooled elbow and spray chamber at each furnace to temper the gases, damper controlled canopy hoods which are located over the furnaces and above the overhead cranes, and all necessary ductwork connecting the collection points. This control system provides a method of ventilating the three million cubic foot electric furnace building, plus a leaded steel pouring line and a hot scarfing machine. Five years of operation are reviewed and experience to date with the fume control system is reported in terms of operational characteristics, development, equipment design and specifications, and cost to maintain. After the equivalent of five years of continuous service, only 50% of the 3120 glass fabric bags have been replaced because of wear. Outlet dust loading measured in the exhaust air of the atmosphere from the baghouse compartments averages 0.0017 to 0.0047 grains/cu ft. Operational costs have been reasonable. Air pollution control legal requirements have been met. Dust and fume has either been evacuated direct from furnace to baghouse or evacuated from the furnace building in the case of effluent from charging and tapping. The success of the system has been established by the fact that the fume is prevented from escaping into the open atmosphere outside of the furnace building. The company is satisfied with this installation, and believes that the baghouse collector is properly applied. The present system provides adequate ventilation most of the time, but additional modifications may be required in future to avoid peak fume conditions inside the furnace building. (Author abstract modified)

10499 APTIC NO. 28498

Brown, Robert F. and Alan B. Walker

FEASIBILITY DEMONSTRATION OF ELECTROSTATIC PRECIPITATION AT 1700 F.

Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 29p., 1970. 7 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 63rd, St. Louis, Mo., June 14-18, 1970, Paper 70-27.)

An experimental high temperature, high pressure electrostatic precipitator module was designed, fabricated, and then evaluated in a gaseous environment having the characteristics anticipated for the combustion chamber of a system for generating electric power from the incineration of municipal solid wastes. No significant hardware failures occurred during the test program, attesting to th excellent design of the precipitator module for the extreme gas temperature and pressure conditions. Stable positive and negative corona discharges were established in combustion gases from the burning of methanol and air (temperature and pressure approximately 1700 F. and 100 psig, respectively) without any apparent deleterious effects due to thermal ionization and/or emission. At gas conditions of about 1700 F and 50 psig, positive polarity energization of the discharge electrode appeared superior to that of negative polarity in terms of voltage level that could be applied and electrical stability. However, precipitator performance on removal of alumina dust injected under controlled conditions with the methanol fuel showed that negative polarity is superior to positive polarity at the selected conditions of 1650 F and 100 psig which closely correspond to those required for optimum operation of the gas turbine presently under consideration. Removal efficiencies ranging from 25% for positive polarity to as high as 87% with negative polarity were measured. In order to check whether materials having a low ionization potential would thermally ionize to such an extent that the voltage-corona current characteristics of the precipitator would be impaired, rendering it ineffective, potassium chloride salt in solution was injected with the fuel. Amounts of approximately one part by weight of potassium ion in 2500 to 3000 parts by weight of gas at 1700 F tripled the current measured for a given voltage when compared to non-injection Several areas for future investigation were uncovered which could lead to further optimization of precipitator performance, such as the apparent critical aspect of gas pressure on establishment of negative corona in the high temperature region and the poor performance of the precipitator in removal of particulate when energized on positive polarity compared to negative polarity. (Author abstract modified)

10500 APTIC NO. 28499

Sprung, Siegbert

THE BEHAVIOR OF SULPHUR DURING THE FIRING PROCESS OF CEMENT CLINKER.

(Das Verhalten des Schwefels beim Brannen von Zementklinker). Tonind. Ztg., 89(5-6):124-130, 1965. 19 refs. Translated from German. Belov and Associates, Denver, Colo., 24p., Dec. 18, 1970.

The sulfur dioxide concentration in flue gas from cement furnaces is considerably lower than could be expected according to the sulfur concentration of the raw materials and the fuel used in the firing process. In laboratory experiments, the reaction of calcite and SO2 was tested; in industrial experiments, the alkali sulfur balance for various furnaces was established. In a temperature range of 400-500 C, calcite reacts with SO2 and leads to the formation of calcium sulfate. The conversion rate can be increased by an increase in temperature, enlargement of the specific surface area of the introduced powder, and by the presence of water vapors during the gas phase. At first, a phase contact surface reaction occurs; after enclosure of the calcite kernal by CaS04, diffusion reactions become a deciding factor of speed. The SO2-emission and the alkali and sulfur utilization of two Lepol furnaces, three gas suspension-heat exchanger furnaces and one shaft furnace using coal or oil as fuel were determined. It was shown that 79-98% of the sulfur output in the clinker occurred as sulfate. A nearly linear relationship between the alkali-sulfur trioxide ratio in the furnace gas phase and the SO2-emission was found. This SO2-emission can be reduced in the furnace gas phase by an increased amount of alkali. By gas suspension-heat exchanger furnaces, the SO2-emission can be reduced to below 160 mg/N cu m by the addition of a mill drying plant which is powered by the flue gases. (Author summary modified)

10501 APTIC NO. 28502

Prime Minister, Delegation for Scientific and Technical Research

SCIENTIFIC AND TECHNICAL MEANS OF DIMINISHING POLLUTION, INHALED OR ASSIMILATED FROM THE ENVIRONMENT–AND OF DIMINISHING ACOUSTICAL INTERFERENCE.

(Moyens scientifiques et techniques de diminuer la0 pollution des milieux inhales ou ingeres et des 'nuisances' acoustiques). In: Pollution and Acoustical Interference of Industrial and Urban Origin. (Les pollution et 'nuisances' d'origine industrielle et urbaine). Vol. I, Paris, France, June 1966, Chapt. 3, p. 47-59. Translated from French. Belov and Associates, Denver, Colo., 49p., Oct. 13, 1970.

Aspects of natural and technological control methods for air, water, and noise pollution are discussed, with suggested topics of research given for each. Plants have an ability to function as air purifiers, within the limits of their toleration to various individual pollutants. The effects of such pollutants as ethylene, carbon monoxide, sulfur dioxide, and fluorides on plants are described. The purifying action of water plants and bacterial beds has application to water purification in treatment facilities as well as in natural fresh water bodies. Purification processes within the bed of a lake are also considered. Control methods for suspended particulates from industrial and domestic sources including separators, filters, and electrostatic precipitators, are briefly noted, while the various design, operational, and control device techniques now under study for control of motor vehicle emissions, particularly storage batteries for electric propulsion, design modifications and catalytic afterburners, are considered at length. Also discussed are pretreatment of industrially polluted waters, potential uses of water treatment sludge, and means for preventing and/or absorbing noise in residential, business, and industrial areas.

10502 APTIC NO. 28503

Peew, Dimo and B. Hadschow

SULFURIC ACID CORROSION IN STEAM BOILERS THROUGH THE USE OF SULFUR-CONTAINING HEAVY OILS.

(Schwefelsaeurekorrosion in Dampfkesseln bei Verfeuerung von Schwefelhaltigen Schweroelen). Text in German. Energietechnik, 21(1):30-33, Jan. 1971. (Presented at the Waermetechnischen Kolloquiums der Technischen Hochschule Otto von Guericke, 4th, Magdeburg, East Germany, July 1970.)

Studies of sulfur trioxide formation in flue gases, dew-point temperature, and corrosion speed in relation to boiler load and surplus air were carried out on four boilers operated at normal load, nominal load, and partial load. For flue gas analysis, a measuring point ahead of the air preheater was selected. Sulfur trioxide formation increased with increasing fuel-to-air ratio. The SO3 content in the flue gas rose from 0.00094% by volume at lambda 1.23 to 0.00204% by volume at lambda 1.56. Conversion of SO2 to SO3 was decisively influenced by the presence of atomic oxygen which develops through dissociation of the flue gases at the high temperatures found in oil-fired combustion chambers. A proportional dependence exists between SO3 concentration in the flue gas, dew point temperature, and corrosion speed. Injection of earth alkaline additives with a high fraction of magnesium oxide and calcium oxide reduce the SO3 concentration in the flue gases considerably.

Powdery additives with more than 80% MgO and grain sizes of less than 80 mesh are very suitable for reducing the dew point temperature and sulfuric acid corrosion.

10503 APTIC NO. 28504

Isobe, Kosaku

A NEW ELECTRIC DUST COLLECTING DEVICE.

(Denki kyujin sochi). Text in Japanese. (International Electric Co., Ltd. (Japan)), Japan. Pat. Sho 45-30400. 2p., Oct. 1, 1970. 2 refs. (Appl. March 1, 1966, claims not given).

An electric dust collector containing a vesicatory material, i.e., a polyurethane sheet, in which fine particulates of activated carbo are embedded is presented. Porous electrodes are dispersed on the polyurethane surface. By applying high voltage to these electrodes, the dust in the air current is sucked and trapped. When direct, high voltage is applied between positive and negative electrodes, the distribution of electric fields on polyurethane fil on which activated carbon particulates are dispersed would be in parallel. Where there is no activated carbon particulate between positive and negative electrodes, the electric line from the positive electrode is concentrated on the part of the film where the particulate exists and is distributed from the particulate to the other particulates with lower electric potential, ending up in the negative electrode. Therefore, the surface intensity of the electric field of particulates is strengthened; because of the presence of these particulates, the intensity of the electric field of polyurethane itself is strengthened. As a result, the electric field on the surface of the net-like electrodes becomes locally strengthened. Thus, when the dust-containing current passes the net of electrodes and the porous part of the polyurethane, the dust in the current is sucked and trapped on the surface of the net-like electrodes due to strong static suction. The material used for this device, polyurethane and carbon black or activated carbon (pulverized to 100-200 mesh), are inexpensive. Th polyurethane is elastic, easy to install, and can withstand high voltage. Dust collecting efficiency is about 95%.

10504 APTIC NO. 28517

STACK AND BOILER CONNECTION.

(Schornstein und Kesselanschluss). Text in German. Oel Gasfeuerung, 16(3):332-340, March 1971.

There are two approaches to conduction waste gases to the atmosphere. (1) If the gases have a temperature higher than that of ambient air, they will be lighter than air and rise upward by their own force. The buoyancy of the gases depends on the stack height and the density difference between the cold air and the flue gases. (2) The gases are blown out of the furnace with the aid of a blower. The stacks must be higher than the roof to guarantee sufficient dilution of the waste gases. Oil-fired furnaces require stacks with smaller cross sections than coke-fired furnaces. This is frequently overlooked by plants switching from coke to oil, and as a consequence, the flue gases are overcooled and thus corrosive. Soot formation, too, can be favored by an overly large stack cross section.

10505 APTIC NO. 28523

Rueb, Friedmund

COMBATING AIR POLLUTION IN THE UNITED STATES.

(Luftreinhaltung in den USA). Text in German. Chemiker Z., 95(4):197-201, 1971.

Sulfur dioxide and nitrogen oxides emissions were discussed at a meeting on 'maintenance of clean air'

10506 APTIC NO. 28525

Nakamura, H., J. Yagi, and K. Osada

CATALYZER FOR PURIFICATION OF AUTOMOBILE EXHAUST GAS.

(Jidosha haiki gasu jokayo shokubai ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):257, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 10th, 1970.)

In the course of a study aimed at developing better catalytic converters, a catalyst was developed that converts carbon monoxide contained in automobile exhaust gas into carbon dioxide. The catalyst consists mainly of cobalt oxide and other subsidiary metallic oxide catalysts. The catalyst becomes active at 85-95 C, and the rate of conversion to carbon dioxide increases with the rise in temperature until 100% conversion is obtained at about 150 C. Since the catalyst is also a refractory material, its quality is not depreciated by the rise in temperature, such as during idling after high-speed driving. The carbon dioxide conversion rate is graphically presented up to 950-1000 C. Conversion efficiency is very high as the catalyst has a large surface area and low specific gravity.

10507 APTIC NO. 28531

Swietochowski, Olivier von

THE ECONOMIC INCINERATION OF FINE COAL IN BOILER FURNACES BY THE IGNIFLUID FLUIDIZED BED METHOD.

(Die wirtschaftliche Verbrennung von Feinkohlen in Dampferzeugern nach dem Ignifluid-Wirbelbettverfahren). Text in German. Energie Tech., 23(3):79-82, 1971. 7 refs.

In the Ignifluid fluidized-bed furnace, combustion is very intense and takes place in a reducing atmosphere. Complete combustion of the combustible gases and fly coke takes place above the fluidized bed where secondary air is injected laterally. The carbon dioxide content in the gas is not higher than in systems fired with high-quality pulverized coal. Because the grain sizes of the dust in the waste gases are larger than in pulverized coal-fired furnaces, only 35 to 45% of the ash must be precipitated in the electrostatic precipitator as compared to 80 to 90% for pulverized coal-fired furnaces.

10508 APTIC NO. 28532

Sedach, V. S., G. S. Nosko, Ya. D. Semisalov, and N. A. Polkovnichenko

INCREASING SCRUBBER THROUGHPUT BY MODERNISING THE NOZZLES.

Coke Chem. (USSR) (English translation from Russian of: Koks i Khim.), no. 70:47-48, 1970. 3 refs.

The possibility of improving the design of the nozzles used in benzole scrubbers was investigated in order to give better atomization and increase the volume of liquid absorbent with installing more nozzles. By adjusting the live sections of the spray nozzles, it has been possible to increase the wash oil throughput by 11%. The modernized nozzles distribute the spray more uniformly over the top of the grid packing in the scrubber, and their useful life is much longer. The extra power consumed by the new nozzles is within the capacity of the pumping equipment already provided. (Author conclusions modified)

10509 APTIC NO. 28538

Wiebe, Herbert and Walter Gausepohl

THERMAL CLEANING OF WASTE AIR.

(Thermische Abluftreiningung). Text in German. Brennstoff-Waerme-Kraft, 23(3):98-102, March 1971. 7 refs.

Combustors are particularly suitable for the thermal treatment of waste gas, but they are expensive and noisy. Fuel and air are rapidly mixed with each other. The air enters the combustion chamber not coaxially but in a rotary movement. A combustor is used to clean solvent-laden waste air from a drying station of an automobile coating plant. The waste air enters the combustor at 160 C, while the cleaned air leaves the chamber at about 800 C. It is cooled in a heat exchanger and the heat liberated used for a car body dryer. The use of a combustor in a synthetic coating plant and for cleaning the waste gases from a hardening chamber for phenol resins is also described. Measurements of the pollutant concentrations immediately behind the combustor revealed that the cleaned gases contained between 40-1000 ppm carbon monoxide, 2-15 ppm nitrogen dioxide, and 25-60 ppm ammonia.

10510 APTIC NO. 28539

Wicke, M. and F. E. Krebs

COMPARATIVE EXPERIMENTS OF THE PROPERTIES AND COLLECTION EFFICIENCY OF WET DUST COLLECTORS.

(Vergleichende Versuche zum Betriebsverhalten und zur Abscheideleistung von Nassentstaubern). Text in German. Chem. Ing-Tech., 43(6):386-391, 1971. 10 refs.

A study of 25 different wet dust collectors showed that they could be divided into five basic categories for preliminary evaluation: scrubbing towers, impactors, jet scrubbers, rotary scrubbers, and venturi scrubbers. The simplest version of scrubbing towers consists of an empty tower into which water is injected through nozzles. Pressure loss is low (less than 10 mm water) and collection efficiency moderate. In impactors, the dirty gas flow impinges on a water surface where a preliminary collection takes place. The gas then passes through a duct carrying water, which is atomized through deflection of the gas flow. In the jet scrubber, the scrubbing fluid is injected, at 3-6 atm gauge, through a nozzle that parallels the gas flow. The scrubbing fluid gas ratio is high (between 5-25 l/cu m) and so is power consumption. In the rotary atomizers, the gas enters tangentially into a cylindrical container and passes through one or more stages. Collection efficiency is higher than that of any of the previous scrubbers, but power consumption is extraordinarily high. Compared to these four types, the venturi scrubber is extremely efficient and comparable to good cloth filters.

10511 APTIC NO. 28540

Dahlmann, A.

EFFECTS OF AUXILIARY BURNERS FIRED WITH NATURAL GAS AND AFTERBURNING OF CO GASES IN THE CUPOLA FURNACE IN RESPECT TO HEAT TECHNOLOGY AND METALLURGY.

(Auswirkungen von Erdgaszusatzfeuerung und Nachverbrennung von CO-Gasen im Kupolofen in waermetechnischer und metallurgischer Hinsicht). Text in German. Technica, 20(6):527, 1971. (Presented at the Kolloquiums des Laboratoriums fuer Metallurgie, in Verbindung mit dem schweiz Verband fuer die Materialpruefungen des Technik Zurich, Switzerland, Jan. 20, 1971.)

The effect of a natural gas-fired auxiliary burner on the product from a cupola furnace was studied. A cold-blast cupola furnace 800 mm in diameter was used for the experiments. Reduction of the coke charge to 9% and increased substitution of the coke energy by natural gas reduced the quantity of dust emitted from the furnace to half of the original quantity. The grain size spectrum of the dust was changed so that the larger fractions prevailed. At a charge of 9% coke, the carbon monoxide content of the waste gas was 2 to 4%.

10512 APTIC NO. 28551

Ciochina, Ioan N., Mihai M. Marcu, Ion Manta, Alin Ciochina, Maria Srainer, Ileana Simionescu, and Elena Nicolau-Toader

METHOD FOR THE CLARIFYING OF THE WASTE WATERS SURCHARGED WITH COLLOIDAL CLAYEY, MARLY AND OTHER ANORGANIC OR ORGANIC IMPURITIES WITH THE AID OF THE AIR POLLUTANTS.

An. Stiint. Univ. 'A. I. Cuza' Iasi, Sect. Ic. Chimie (Jassy), 16(2):215-224, 1970. 14 refs.

Waste water of three coal washing plants which discharge sludge into the clayey and marly waters of the rivers of Rumania were studied. A mixture of sulfur dioxide, carbon dioxide, and carbon monoxide, was used. The SO2 and CO2 solution are mixed with the waste water, and the CO is then used as a stirring agent. Preliminary removal of sand from the washing water was necessary because of the triboelectric and piezoelectric effects of the sand content. Experimental results are tabulated. For coal washing plants, it is recommended that the gas mixture of SO2, CO2, and CO be realized with the aid of common vertical furnaces placed upstream from the plant and supplied with coal or coal plus pyrite. This will supply the coal-washing plant with previously clarified water. The gas mixture, after cooling with spray water, will flow through a three-sided pipe or trough suspended by wire cables from the shore of the river. The surface of the river into which clay or marley waste flows will form the fourth surface of the pipe. For 'foggy' towns, emitted gases from all sorts of furnaces will be gathered by a vaccum collector, cooled, and sent through a pipe line to the river where it will go through the three-sided pipe line. Also, pollution of the atmosphere by exhaust gases can be controlled by aspiration of the polluted air in the center of town and at taxi stations, through a network system of pipes in the sanitary sewers leading to the three-sided pipe in the river. This method completely ensures the removal of clayey or marly suspensions as well as phenolic carcinogenic compounds.

10513 APTIC NO. 28552

Sheehan, John J.

SCRUBBER APPARATUS.

(Buell Engineering Co., Inc., Lebanon, Pa.) U. S. Pat. 3,544,088. 6p., Dec. 1, 1970. 13 refs. (Appl. March 13, 1967, 6 claims).

A scrubber apparatus which comprises an angularly bent housing with an inlet and outlet for the passage of a gaseous fluid stream was invented. The housing contains two glomerate impingement media which act together to provide a variable orifice region between them for controlling the flow of the gaseous fluid stream between the inlet and the outlet of the housing. A liquid supply source associated with one of the glomerate impingement media flows in a streamlike spray into the vicinity of the orifice region and onto the other glomerate impingement media. The spray washes the collected dust from the surfaces of the impingement media and mixes and moisturizes the gaseous fluid stream. The apparatus permits automatic controlling of the flow of the gaseous fluid stream to be cleaned and provides a system wherein a predetermined pressure differential may be automatically maintained between the inlet and the outlet, thus providing a high velocity and turbulent mixing action of the gaseous fluid stream. The impingement media is inexpensive to replace and affords efficient resistance to wear from the particles in the gaseous fluid stream. A novel construction and arrangement which prevents any clogging is used to introduce the liquid in the form of a streamlike spray. The present invention also provides a novel construction of a scrubber apparatus which may be used independently or conjunctively as an attachment for another cleaning device.

10514 APTIC NO. 28554

Floyd, Frederich

GAS FILTERS.

(Ozonair Engineering Co., Ltd., Rochester (England) U. S. Pat. 3,552,099. 6p. Jan. 5, 1971. 19 refs. (Appl. April 27, 1967, 7 claims).

Improved high efficiency gas filters, particularly for filtration of air in heating, ventilating, and air cooling systems were invented. One such gas filter has a porous sheet conveyor supporting and moving a filtering web along zig-zag path across a casing with flexible sealing strips mounted in channels extending along the sides of the casing. The roll type filter is furnished with an inexpensive filter material of low mechanical strength. The roll of filter web may be mounted on a spool carriage having resilient bearing assemblies at its ends that ensure that the resistance of the roll which is unwinding will not cause the filter web to tear and yet is sufficient to prevent the roll from overrunning. The conveyor may be provided with stationary means for sealing the edges of the readily replaceable filter web. The air or gas flow through the compartment may be utilized to bring the leading edge of the filter web onto the conveyor band in correct alignment during initial loading, to maintain the seals properly disposed in gas-tight contact with the filter web, and to maintain the filter web in contact with the endless conveyor band so as to convey the filter web in correct position throughout the zigzag configuration.

10515 APTIC NO. 28565

Lieberman, A. and R. D. Scott

ATMOSPHERIC PARTICLE PENETRATION THROUGH HIGH EFFICIENCY FILTERS.

Harvard Univ., Cambridge, Mass., Air Cleaning Lab. and Atomic Energy Commission, Washington, D. C., Div. of Reactor Development and Technology, Proc. At. Energy Comm. Air Cleaning Conf., 11th, Richland, Wash., 1970, p. 751-765. 6 refs. (Aug. 31-Sept. 3.)

NTIS: CONF 700816

Penetration of atmospheric particles through filters with rated DOP removal efficiencies ranging from 90% to 99.97% was studied at two urban sites. Exact data on dioctyl phthalate (DOP) removal were obtained with a Q76 penetrometer. Atmospheric particle number concentrations were determined in the size ranges 0.3-0.5, 0.5-0.7, 0.7-1.0, and 1.0-3.0 micron, up and downstream of the filters. In most cases, the DOP penetration was below the manufacturers' stated penetration. Atmospheric particle penetration in Los Angeles averaged below the classification in all cases, but was much greater at the San Francisco Bay Area site. It is concluded that a relationship between penetration of DOP and atmospheric aerosols does exist for high efficiency filters, but is qualitative only. Variation in atmospheric aerosols apparently causes penetration to vary from place to place. The DOP penetrometer then characterizes a filter, but the performance of the filtration system must also take into consideration the nature of the challenge aerosol. The effect of variations in filter face velocities are noted. (Author conclusions modified)

10516 APTIC NO. 28569

Brink, J. A., Jr.

REMOVAL OF PHOSPHORIC ACID MISTS.

In: Gas Purification Processes. G. Nonhebel (ed.), London, George Newnes Ltd., 1964, Chapt. 15, Part B, p. 720-741. 58 refs.

In any process where phosphorus comes into contact with air or even gases containing a small percentage of oxygen, phosphorus pentoxide is formed which, in the presence of moisture, forms phosphoric acid (P2O5) mist. The most common occurrence of P2O5 mist is in the manufacture of phosphoric acid from elemental phosphorus. The particle size distribution of P2O5 mist in a phosphoric acid plant is shown and noted to be characterized by an appreciable percentage of particles less than one micron in diameter. Four types of mist collection equipment being used in the chemical industry are packed towers, venturi scrubbers, electrostatic precipitators, and fiber mist eliminators. The different types of equipment give different mist collection efficiencies, have different pressure-drop requirements, differ in their ability to handle any solids which ma be present in the gases, and may be constructed of different materials which may or not be suitable from the standpoint of corrosion. Also, the capital cost and operating cost requirements vary greatly from one type of equipment to another. The proper choice of equipment can be made only after such factors are considered.

10517 APTIC NO. 28570

Little, A.

SAMPLING OF DUST-LADEN GAS.

In: Gas Purification Processes. G. Nonhebel (ed.), London, George Newnes Ltd., 1964, Chapt. 14, Part A p. 580-601. 6 refs.

The testing of performances of grit, dust, and fume collectors falls into two distinct categories: the testing of installed equipment, and the testing of proprietary equipment, usually by research organizations in laboratories. The former category is important to those who are in charge of full-scale dust arrestors. When such equipment is newly purchased, it is important to verify that the equipment performs satisfactorily or meets its guarantee. The second category is important to those who are developing equipment for future sales and to those who need to select from a number of apparently suitable installations the type which is most suitable for the particular duty being considered. The methods of testing in the two categories are described in detail, with specific reference to sampling systems, performance test planning (with example), equipment for extreme (high and low) dust concentrations, expression of test results, special laboratory testing, and modified sampling techniques for particular plant processes (toxic gases or dust, inflammable gases, and gases at pressure). (Author introduction modified)

10518 APTIC NO. 28571

Fabuss, Bela M. and Ilan Katz

REDUCTION OF NITROGEN OXIDES.

Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 13p., 1970. 9 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 63rd, St. Louis, Mo., June 14-18, 1970, Paper 70-67.)

Nitrogen dioxide and nitric oxide reduction experiments were conducted by passing a test gas through a bed of activated carbon in a fixed bed reactor, and comparing the rate of reduction of the nitrogen oxides with the rate of combustion of the carbon. Over the investigated temperature range of 700-900 C, the NOx reduction was never below 50% and most of the conversions fell into the 80-96% range. The data indicate that the reduction of NOx is controlled by the diffusion of reactants to the carbon surface at lower temperatures than the combustion of carbon. The intrinsic velocity of the reaction seems to be larger on certain carbons than that of carbon combustion, suggesting that a selective process could be developed for removing NOx from combustion gases by appropriate control of processing conditions and by using an appropriate carbon source or a pretreated carbon to increase the NOx reduction rate. The kinetics of the reactions involved are developed.

10519 APTIC NO. 28574

Dean, R. S. and R. E. Swain

REPORT SUBMITTED TO THE TRAIL SMELTER ARBITRAL TRIBUNAL. PART III. PROVISIONAL REGULATIONS ADOPTED DURING TRIAL PERIOD AND THEIR EFFECTIVENESS.

Bull. Bureau of Mines, no. 453:229-296, 1944.

The problem of smoke control was investigated from April 1, 1938 to Aug. 1, 1940, at a mining and smelting company to determine whether control methods could be established to avoid damage to the environment from sulfur dioxide emissions. During the first growin season, the average daily sulfur emitted to the atmosphere ranged from 68 tons during April to 155 tons in August. Three SO2 monitoring stations were established. The one in the U. S., at Northport, Wash., showed no concentration above 0.5 ppm for a period longer than 20 min during the first growing season. For the growing season of 1939, a revised set of regulations for smoke control was used. The chief modification was recognition of the turbulence of the wind as an important factor. A bridled-cup-type turbulence meter was installed at the plant, suspended from a cable stretched between two stacks. Review of the SO2 concentration records was satisfactory. The Northport station showed no recordin higher than 0.3 ppm even during June, the month of heaviest fumigation. During the growing season of 1940, a manual of operations was developed for the smelting plant. The text of the manual is included in the report. Base loads were established for growning and nongrowing seasons at 4 tons of sulfur per hour from 3 am to 9 am, and 7 tons for 9 am to 3 am. Factors which permitted increases in the base loads were favorable winds of 5 mph or more, a favorable geostrophic forecast (26-34 inclusive), and turbulence of 4 mph or more. Factors which required a decrease in the base load were unfavorable winds of 5 mph or more or any wind less than 5 mph, unfavorable geostrophic forecast (5-15 inclusive), and turbulence less than 1 mph. It was concluded that the distribution of SO2 from the smelter stacks may be sufficiently rationalized to make possible the control of the gas concentrations occurring across the International Boundary in the U. S. on a meteorological basis, without an arbitrary limitation on the total amount of sulfur dioxide emitted by the smelter.

10520 APTIC NO. 28577

Rixon, F. F.

CATALYTIC DESTRUCTION OR CONVERSION OF IMPURITIES. PART A-GASEOUS IMPURITIES.

In: Gas Purification Processes. G. Nonhebel (ed.), London, George Newnes Ltd., 1964, Chapt. 11, p. 425-455.

Industrial processes for the catalytic purification of gases are divided in two categories. Where the product is water vapor, which can be condensed out, or water vapor, carbon dioxide, sulfur dioxide, or nitrogen contained in a gas which is passed to waste, the gas treatment is classed under catalytic destruction of impurities. Where the product is an inert diluent or a substance, other than water vapor, which can be removed from the gas, the gas treatment is classed as catalytic conversion of impurities.' Examples of the specifications for the maximum allowable concentration of the impurity in the purified gas are given. Problems of catalyst selection for processes in both categories are discussed. Considerations of plant design are given, with particular attention to reactor design, preheating equipment, heat recovery, process control, starting-up procedure, and catalyst regeneration. Examples of catalytic conversion processes include hydrogenation of oxides of carbon to methane (methanation); methanation of carbon monoxide and carbon dioxide at approximately atmospheric pressure in the production of high-purity hydrogen; methanation of carbon monoxide and carbon dioxide at high pressures in the production of ammonia synthesis gas; hydrogenation of acetylene to ethylene and ethane; removal by selective hydrogenatio of acetylene from ethylene produced by cracking of hydrocarbons; and removal of organic sulfuric compounds from town gas by reduction or oxidation. As an example of a catalytic destruction process, the destruction of oxides of nitrogen in tail gases is discussed.

10521 APTIC NO. 28578

Rowson, H. M.

DESIGN CONSIDERATIONS IN SOLVENT RECOVERY.

American Inst. of Chemical Engineers, New York, American Inst of Mining Metallurgical and Petroleum Engineers (AIME), New York, N. Y., American Society of Civil Engineers, New York, American Society of Heating, Refrigerating and Air-Conditioning Engineers, New York, American Society of Mechanical Engineers, New York, and American Society for Testing and Materials, New York, Engineering Foundation, Proc. MECAR Symp. New Developments Air Pollution Control, New York, 1967, p. 110-128. (Oct. 23.)

The growing understanding of adsorption processes has led to the ability to tailor the properties, such as pore size distribution and overall activity, of an adsorbent to the particular separation that is required. This has been accompanied by the development of fixed-bed and fluid-bed mechanical contacting equipment. As a result of these parallel developments, it is now possible to carry out with very great efficiency a large number of complicated separations. A comparison of the properties and advantages of the fixed and fluid bed systems is presented. Both have a part to play in solvent recovery and air pollution control, the choice between the systems depending on air flow, solvent concentration, solvent type, and operating continuity. Safety aspects of the systems are noted, as are operating efficiencies, method of adsorbent regeneration, and controls and instrumentation required.

10522 APTIC NO. 28580

Billings, Charles E. and John E. Wilder

ENGINEERING ANALYSIS OF THE FIELD PERFORMANCE OF FABRIC FILTER SYSTEMS.

Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 41p., 1970. 15 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 63rd, St. Louis, Mo., June 14-18, 1970, Paper 70-129.)

Results of a survey of a number of operating fabric filter systems are presented for industrial categories which include combustion, food and feed, pulp and paper, inorganic chemicals, organic chemicals, petrol refining, non-metallic minerals, iron and steel and non-ferrous metallurgy. Data are presented on major engineering variables affecting design and use (filtering velocity, dust concentration, and specific dust-fabric filter resistance coefficient), on economic factors related to capital, operating and maintenance costs, and on types of operating problems or failure modes associated with bag life, repair, and maintenance. Sizes surveyed ranged from 100 to 100,000 sq ft. Specific dust-fabric filter resistance coefficients ranged from 1 to 1000, depending upon parameters such as particle size, application, and fabric construction. Capital costs ranged from 1 to greater than $20/cfm, depending principally on severity of service requirements. Maintenance costs ranged from $0.10 to $1.0/cfm/yr. Reported bag life ranged from a few months to greater than 10 years. Generally, most applications surveyed indicated one or more of several bag failure modes or other problem areas associated with continued satisfactory performance. (Author abstract modified)

10523 APTIC NO. 28591

Teske, Wolfgang

REPORT ON LECTURE GROUP 'G' OF THE CONGRESS 'REINHALTUNG DER LUFT 1969.' Staub (English translation from German of: Staub, Reinhaltung Luft), 30(2):35-42, Feb. 1970. 21 refs.

Dust precipitators are grouped according to the separating forces that act on particles; improvements in separators can be achieved through extensive research and mathematical analysis of flow and separation processes. Such research on cyclones led to the development of the rotational-flow dust precipitator, which can clean several million cu m/hr gas quantities. Also discussed are inertial separators for drop separation from flowing gases and the use of irrigated cloth filters for eliminating acid mists. The performance of the filters is compared with that of electrostatic precipitators and venturi separators. British air pollution legislation and its administration is described. Finally, reference is made to a German index of air-pollution literature, Reinhaltung der Luft--Selecta.

10524 APTIC NO. 28596

Spurny, K. and J. Pich

THE SEPARATION OF AEROSOL PARTICLES BY MEANS OF MEMBRANE FILTERS BY DIFFUSION AND INERTIAL IMPACTION.

Intern. J. Air Water Pollution (London), vol. 8:193-196. 3 refs.

Model membrane filters were studied under the condition that the ratios of the mean radius of aerosol particles (r) to the mean radius of the membrane filter pores (R) were less than 1 and very much less than 1. Radioactive aerosols were used for measurement of the relations E equals E(r), E equals E(q), and E equals E(L), (E being the total efficiency of the membrane filter, q the linear rate of gas flow in front of the filter, and L the thickness of the filter). The experimental results showed that separation by diffusion is practicable, especially with very small aerosol particles and with very low rates of gas flow. Equations based on a capillary model of a membrane filter are given, expressing its efficiency as a function of two dimensionless parameters which describe the retention by diffusion and impaction of aerosol particles. The consistency of the experimental results with the theoretical curves E equals E(q) and E equals E(r) calculated by means of the given equations is good. The divergencies may originate in the idealization of the membrane structure (the values R and L may show a considerable error) and in the influence of phenomena such as the direct interception of particles and the influence of electrostatic forces.

10525 APTIC NO. 28599

Peters, Werner

THE POTENTIAL FUTURE OF COAL BY NEW PROCESSES OF ENERGY CONVERSION. (Chancen fur die Kohle durch neue Verfahren zur Energieumwandlung). Preprint, Steinkohlenbergbauverein (West Germany), 10p., 1968. Translated from German by Belov and Associates, Denver, Colo., 11p., Dec. 3, 1970. (Presented at the Steinkohlenbergbauverein, Members Convention, Essen, West Germany, Dec. 17, 1968.)

Three scientific innovations in coal processing are described and evaluated: the whirling layer heating system; magnetohydrodynamic (MHD) energy conversion; and coal combustion with process heat from a nuclear reactor. The efficiency of the whirling layer heating system is brought about by the complete combustion of fine coal (granulation 0-3 mm) kept in suspension in warmed air. Desulfurization of the smoke gas can be achieved by the addition of fine grain limestone to the coal. This system can be expected to lower electricity production costs by approximately 10-15%. A pilot plant will start production in 1970. The MHD energy conversion system is advanced far beyond traditional techniques. It depends on the ionization of hot smoke gas (above 2500 C) which is then driven through an electromagnet. The loss of temperature and pressure is converted into electric current. The MHD generator used as an aggregate to a conventional power plant will increase total efficiency as much as 60%, thus reducing electricity production expenses by 12-25%. Coupled with a continuous coking plant, the MHD generator would lead to coke production with no by-products except the production of electric current. A prototype MHD generator is in use in the U.S.S.R. The functional realization of the whirling layer heating system and the MHD generator can be expected in the mid-1970's, at the earliest. The method of carburetion of coal with process heat from nuclear reactors will be used for the economical production of raw material for the chemical industry from coal, synthesis gas, or hydrogen. The advantage of this method is that 30-40% of the coal which would otherwise be necessary for the production of fine synthesis gas is replaced by less expensive reactor heat. Also there is no necessit for using oxygen, as is required for traditional methods of coal carburetion. Technical realization of this method is far off, but the goal is reachable. Carburetion through nuclear heat can be expected by the 1980's.

10526 APTIC NO. 28601

Ward, D. E.

PURIFICATION OF CRYOGENIC GASES.

In: Gas Purification Processes. G. Nonhebel (ed.), London, George Newnes Ltd., 1964, Chapt. 10, p. 367-424. 59 refs.

Various methods of removing minor impurities from cryogenic gases prior to their low temperature liquefaction or processing are described, together with some of the more important aspects of thei practical operation. The gases considered are air and its constituent gases, coke oven and converter gases, and hydrogen. Th four main methods of gas purification, as applied to low temperatur plants are chemical purification, absorption, adsorption, and formation of another phase. Factors involved in the economical construction of a cryogenic gas purification plant are discussed, such as energy requirements for pumping out heat, optimum size of adsorber, maintenance requirements, removal of impurities which deposit on heat exchanger surfaces, and deviations from ideal gas behavior as the critical temperature of the bulk gas is approached. Brief mention is also made of purification methods for argon, krypton and xenon, and helium.

10527 APTIC NO. 28605

Martin, G. Blair, J. H. Wasser, and R. P. Hangebrauck

STATUS REPORT ON STUDY OF EFFECTS OF FUEL OIL ADDITIVES ON EMISSION FROM AN OIL-FIRED TEST FURNACE.

Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 20p., 1970. 9 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 63rd, St. Louis, Mo., June 14-18, 1970, Paper 70-150.)

A standard screening procedure was established for testing additives in a distillate-oil-fired test furnace. The test system was constructed and an operational baseline established. Emissions measured were carbon monoxide, carbon dioxide, oxygen, unburned hydrocarbons, sulfur oxides, nitrogen oxides, and carbon particulates. Samples of all known fuel additives were obtained and analyzed for elemental content, and a system for classification by chemical composition was established. Results showed that a majority of the proprietary additives tested had no beneficial effects on air pollutant emissions from the test system. Some additives increased particulate emissions; whereas some that contained metals, specifically cobalt, iron, nickel, manganese and barium may reduce particulate emissions. There is need for careful study of other factors such as fuel and furnace effects, cost effectiveness, optimum dose, and toxicology of resultant metallic particulate emissions. None of the additives tested reduced sulfur oxides, and only three appeared to reduce nitrogen oxides marginally. Emulsions of fuel oil and water decreased nitrogen oxide emissions, but increased particulate emissions and caused operating difficulties. Nitrogen in the fuel or an additive significantly increased emissions of nitrogen oxides. (Author abstract modified)

10528 APTIC NO. 28630

Eito, Tadami

WET TYPE METHOD OF SO2 ELIMINATION.

(Nisanka io no shisshiki jokyo hoho). Text in Japanese. (Mitsubishi Heavy Industries, Ltd., Tokyo (Japan), Japan. Pat. Sho 45-34122. 3p., Nov. 2, 1970. 1 ref. (Appl. Aug. 3, 1966, claims not given).

A method for wet type elimination of sulfur dioxide by contacting exhaust gas with sodium hydroxide or kalium hydroxide is presented. At more than 100 C or less than that of the vapor pressure, SO2 is absorbed and eliminated while suppressing the evaporation of the water content of the solution. The lowering of exhaust gas temperature at the outlet of the absorbing device and an increase in humidity is prevented. Both absorbing solutions have high boiling points, so that their vapor pressure is low, therefore it is possible to make their vapor pressure equal to or lower than the temperature of the exhaust gas. After the treatment, SO2 in the exhaust gas combines with sodium hydroxide or kalium hydroxide to form NaHSO4 and is precipitated out. When it is filtered, and oxidized zinc is added, sodium hydroxide which can be recycled can be recovered and liquid SO2 is obtained.

10529 APTIC NO. 28639

A 'FLUIDIC' CHIMNEY FOR AIR-POLLUTION CONTROL.

Eng. Digest, 31(6):87, June 1970.

A solution proposed for the problem of ground-level pollution from chimneys in the 'fluidic' chimney, from which smoke is ejected in discrete vortex rings. Such rings attain much higher altitudes than a conventional smoke plume. A device for forming the vortex rings is shown in an outline drawing, together with its associated equipment. The efficiency of the device is being tested in a 20-ft high model chimney.

10530 APTIC NO. 28640

THE 'CAT-OX' PROCESS FOR REMOVING POLLUTANTS FROM FLUE GASES.

Eng. Digest, 31(7):73-75, July 1970.

The Monsanto 'Cat-Ox' process efficiently removes both sulfur dioxide and fly ash from flue gases emitted by power stations and other large industrial plants. In addition, the process converts the SO2 recovered to sulfuric acid. Two versions of the process are available, i.e., integrated and reheat. Of these, the former is designed from the beginning to be a fully integral part of the total plant at its design stage. The reheat version is an independent system that can be fitted to existing plants. Although the latter system eliminates virtually all fly ash from flue gases, it is not quite as efficient as the integrated system in removing SO2 (85% compared with at least 90% for the integrated system). Both systems are absorbing towers for extracting the majority of sulfuric acid and Brink eliminators for removal of acid mists.

10531 APTIC NO. 28642

Ganieva, T. F., M. S. Belen'kii, and M. Yu. Sultanov

INVESTIGATION OF THE MECHANISM OF CARBON MONOXIDE OXIDATION AND DEGRADATIVE HYDROCARBON OXIDATION OF AN ALUMINUM-COPPER- CHROMIUM OXIDE CATALYST BY A TWO-STAGE CALORIMETRIC METHOD.

Kinetics Catalysis USSR (English translation from Russian of: Kinetika i Kataliz, 11(5):992-994, Sept.-Oct. 1970. 4 refs.

The mechanism of oxidation of C2-C3 olefins, butane, and carbon monoxide on an aluminum-copper-chromium oxide catalyst was studied by a two-stage calorimetric method at 200-900 C. These temperatures correspond to those involved in the detoxification of exhaust gases of gasoline engines. Carbon monoxide and butane were oxidized on the catalyst surface at both low and intermediate temperatures. Only at 600 C did a gas-phase oxidation appear, and it proceeded independently of the presence of the catalyst. Degradative oxidation of the olefins took place on the catalyst surface at low temperatures, but a heterogeneous-homogeneous reaction involving a surface-volume mechanism occurred at intermediate temperatures. At high temperatures, oxidation of the olefins proceeded mainly in the gas phase.

10532 APTIC NO. 28645

Kitagawa, Tetsuzo

PROBLEMS INVOLVING AIR POLLUTION PREVENTION FACILITIES.

(Taikiosen boshisetsubi no mondaiten). Text in Japanese. Nippon Kikai Gakkai Shi (J. Japan Soc. Mech. Engr., Tokyo), 74(626): 234-239, March 1971.

Industrial air pollution was classified into temporary and continuous types. The four basic approaches for prevention of the continuous type air pollution were discussed. The diffusion method in which smoke and exhaust gas are diffused into the higher atmosphere by means of a high chimney and diluted by the atmospheric diffusion can be readily accomplished without modifying existing processes but is not applicable where there are a number of pollution sources close together. The second method was source purification in which the emissions are purified by dust collectors scrubbers, and other purification equipment before being discharged into the atmosphere. The expression of dust removal efficiency is often misleading, in that a purification device with a 99% removal efficiency still fails to arrest 1% of the deleterious contents. The third method was use of sulfur-free fuels such as natural gas. The final method was the use of raw materials and manufacturing processes that would minimize pollutants contained in emitted gas. Temporary pollution is often caused by leakage of deleterious gases from piping systems and component units of equipment, or chemical spraying by helicopters. Proper maintenance and precaution procedures solve this problem.

10533 APTIC NO. 28656

Gavrilescu, GH.

CONDITIONS FOR OBTAINING SO2 GASES IN AN OVEN WITH A FLUIDIZED-BED, FOR USE IN THE MANUFACTURE OF 'RED STAR' CELLULOSE AND PAPER.

(Consideratii asupra obtinerii gazelor de SO2 in cuptoare cu pat fluidizat la fabrica de celuloza si hirtie 'steaua rosie'). Text in Rumanian. Celul. Hirtie (Bucharest), 12(1):14-22, 1963. 4 refs.

Sulfur dioxide is used in the papermaking industry to prepare the bisulfite solution used for cooking the wood pulp. A set of 10 conditions are given, by which maximum efficiency and quality will be achieved in the production of SO2 gas in a pyrite-roasting oven. These include proper purification of the gaseous product, a suitable concentration (at least 12%), a suitable temperature (20 C), the recovery of byproducts (sulfuric acid, heat in the form of hot water or steam, pyrite ash for metallurgical use, arsenic and selenium salts), and protection of the working environment against SO2 and other poisonous fumes. The 'Red Star' factory is equipped with four Kuhn-type mechanical ovens, each with a burning surface of 80 sq m. Each oven is in turn equipped with a cyclone o 1100 mm diameter. The cyclone design and the high content of ash in the gas (2200-2800 mg per cu m) are factors that greatly reduce the efficiency of particulate removal. Various suggestions are made for bringing actual standards of production, efficiency, and safety closer to the ideals enumerated.

10534 APTIC NO. 28657

Potop, P.

RECOVERY OF SULFUR DIOXIDE FROM RESIDUAL GASES.

(Valorificarea bioxidului de sulf din gazele reziduale). Text in Rumanian. Rev. Chim (Bucharest) 13:705-717, 1962. 62 refs.

Description of an original experiment with the absorption of SO2 from gases containing at least 4% of the substance is preceded by a lengthy review of present-day methods of SO2 recovery. In the Soviet Union the production of H2S04 by a partial recovery of sulfur compounds from residual gases increased from 19% in 1960 to 39% in 1965. Recovery methods include (1) methods leading to the manufacture of sulfuric acid and liquid sulfur dioxide, with recycling of the absorbing material (solid absorbents, suspensions in metallic oxides, and absorptions by liquids such as water, sodium carbonate solution, ammonia, and organic solvents); (2) methods leading to the manufacture of sulfites and sulfates (calcium carbonate, magnesium oxide, serpentine, manganese ores, an ammonia); and (3) oxidation of SO2, leading to the manufacture of sulfuric acid (catalytic oxidation). A graph is presented, based on data from the literature and supplemented by original laboratory work, showing the amount of water necessary for absorbing SO2 at 20 C from gases containing differing concentrations of SO2 between 1% and 12%. Using gas containing about 1% SO2, flowing at the rate of 300 liters per hour, the absorption yield was plotted as a function of the rate of flow of water through an absorption column 1.2 high. The same experiment was run with columns of varying heights (0.4, 0.8 and 1.2 m). The optimum absorption yield was found to be 60%, obtained in a column 0.8 m high and with an optimum rate of flow of 200 cu m per ton of absorbed SO2. The yield was inversely proportional to the flow of air.

10535 APTIC NO. 28663

HYDROCARBONS AND AIR POLLUTION: AN ANNOTATED BIBLIOGRAPHY. PART I.

National Air Pollution Control Administration, Raleigh, N. C., Office of Technical Information and Publications, Pub. AP-75, 582p., Oct. 1970.

NTIS: PB-197165

As the level of air pollution attributed to automotive and stationary sources increases, so does the necessity to extend our knowledge of hydrocarbon emissions. Certain hydrocarbon derivatives may have direct carcinogenic effects on lung tissue. One of the major concerns with hydrocarbons as pollutants, however, is in the indirect effects attributed to their role in the formation of smog through photochemical reactions with other substances. Photochemical smog has been associated with plant damage, eye and respiratory tract irritation, and reduced atmospheric visibility. This bibliography represents an effort to collect, condense, and organize the literature on hydrocarbons in relation to air pollution. In the present volume, emission sources atmospheric interaction, measurement methods, and control methods are considered.

10536 APTIC NO. 28669

West, William Ernest, Jr.

EVALUATION OF SULFUR DIOXIDE RECOVERY PROCESSES.

Illinois Univ., Urbana, Thesis (M.S.), 1953, 99p. 34 refs.

Technical and economic aspects of several processes for large-scale recovery of sulfur dioxide from dilute gases, for byproduct recover of sulfuric acid, ammonium sulfate, and sulfur, are considered. The Trail process and numerous modifications of it, as well as the ammonium sulfite-bisulfite cycle including regeneration of ammonium sulfite-bisulfite solution by steam stripping are reviewed and comparisons made of equipment cost, labor and utility requirements, operating costs, cost of chemical inputs, and value of the net products for differing steam costs. It is concluded tha the Trail Process and the Autoclave Process are potentially profitable for the recovery of SO2 from stack gases containing only 0.2 to 0.5% SO2, such as those from the combustion of high sulfur fuels. The Air Oxidation Process may also be profitable, depending on its unknown operating characteristics. If a recovery plant were built at the location of a relatively large sulfuric acid plant, then the three processes would be approximately equal in the percentage return earned on the investment. If a recovery plant were built as a completely independent plant, the Autoclave Process would be superior to the other two because it would require a much smaller investment. Processes to reduce the yield of ammonium sulfate and increase the yield of 'free' sulfuric acid by using steam stripping would not be desirable economically even if the price of ammonium sulfate should fall to $30 per ton. In order to justify recovering sulfur from stack gases containing less than 0.2% SO2, it will probably be necessary to charge part of the operating expenses to the control o atmospheric pollution. If the wet bulb temperature of the stack gases is not higher than about 140 F, dehumidification of the gases prior to absorption of the SO2 cannot be justified from the economi standpoint. (Author conclusions modified)

10537 APTIC NO. 28676

Breslin, A. J. and W. B. Harris

HEALTH PROTECTION IN BERYLLIUM FACILITIES.

A.M.A. Arch. Ind. Health, 19(6):596-648, June 1959. 96 refs.

Experience gained over a period of about ten years in the operation of beryllium facilities under contract to the Atomic Energy Commission has resulted in practical, proven control measures that can serve as guides in the engineering design and safe operation of new or modified installations. The information gathered during the design and operation of these facilities is summarized. Two forms of disease are known to be associated with the production and processing of beryllium materials, respiratory illness and certain kinds of skin reactions. The attainment of an average air concentration of 2 micrograms/cu m or less requires the selection of process components that will release the smallest possible quantities of contamination, local exhaust ventilation, careful operating procedures, thorough housekeeping, and provision for suitable personal protective measures. Sources of neighborhood contamination are indicated. The diffusion of stack effluents is discussed, as well as the computation of a permissible effluent discharge rate. Proper selection of air cleaning equipment will depend on the chemical and physical character of the contaminants and the necessary cleaning efficiency. Waste disposal will mainly involve alum, magnesium fluoride, and miscellaneous sludges. Other controls include training and supervision, in-plant air monitoring, and out-of-plant monitoring. Medical control must be an integral part of the occupational hygiene program, and a procedure for medical examination is indicated. Exposure experience to in-plant concentrations is discussed, as well as to offsite concentrations and those from new plant operation. Data from urinary beryllium samples are mentioned. Air sample analysis is described.

10538 APTIC NO. 28683

Ito, Kaname, Shoichi Miyoshi, and Tamotsu Yamada

REACTION OF SO2 GAS AND MANGANESE DIOXIDE.

Translated from Japanese, Franklin Institute Research Labs., Philadelphia, Pa., Science Info. Service) 2p., Oct. 30, 1969.

An improved method for the removal of sulfur dioxide, and more detailed information about the reaction of SO2 with synthetic activ manganese are presented. Five kinds of synthetic MnO2 and one kind of natural MnO were used as samples. The velocity of their reaction with SO2 was measured with a thermobalance, and the change in reaction time measured from the increase in weight. The curves of the log of the pressure of SO2 versus reaction time show that for the chemically synthesized samples which have a larger surface area, the reaction velocities with SO2 are fairly rapid. In fully crystallized samples or natural samples, the reaction velocities are comparatively slow.

10539 APTIC NO. 28684

Nakai, J.

THE DEVELOPMENT OF DESULFURIZATION PROCESS BY INDUSTRIAL RESEARCH INSTITUTE OF KANAGAWA PREFECTURE.

Ryusan To Kogyo (Sulfuric Acid and Industry), p. 1-4, 1969. Translated from Japanese, Belov and Associates, Denver, Colo., 9p., April 30, 1970.

The multi-purpose gas absorber for sulfur dioxide is suggested and evaluated as the only practical machine ready for installation for plume dehydration. Reasons for its choice and criticisms were presented. A diagram of the apparatus is given and the layout of the desulfurization installation is shown. Curves for the solubility of sulfur dioxide are plotted. The manufacture of a larger machine, with a capacity of 30,000 to 100,000 cu mm/h is being planned.

10540 APTIC NO. 28686

Yoshida, Konen, Ino Kunisachi, and Shigeki Wakabayashi

REMOVAL OF SO2 IN EXHAUST GAS AND PRODUCTION OF MIXED PRECIPITANT.

Translated from Japanese, Franklin Institute Research Labs., Philadelphia, Pa., Science Info. Services, 4p., Oct. 30, 1969.

Inexpensive raw materials for use in the mixed precipitation method of treating industrial waste water and at the same time preventing air pollution were investigated. The exhaust gas used was a mixture of sulfur dioxide, air, and nitrogen gas, which was passed through a layer of vanadium catalyst to produce sulfuric acid by a contact method. The SO2 was converted to sulfur trioxide. A mixture of red sludge, open-hearth furnace slag, and 5% kaolinite was made into a paste, extruded from a large injection tube, and then dried. The same process was used for a mixture of aluminum oxide, obtained from the recovery of aluminum ground metal from scrap aluminium, and 20% kaolinite. The products were reacted with the exhaust gas, and the soluble component thus obtained was fade-tested using a direct orange dye. The results of the SO2 removal and of the fade tests are tabulated.

10541 APTIC NO. 28693

Kruel, Martin

THE BASIC PRINCIPLES OF DRY WASTE GAS DESULFURIZATION.

(Die Grundlagen eines Abgasentschwefelungsverfahrens mit 'trockener' Verfahrensweise). Text in German. Brennstoff-Waerme-Kraft, 23(3):91-97, March 1971. 11 ref.

The basic principles of a dry method of removing sulfur dioxide from waste gases are described. The method operates with waste gas temperatures between 100 and 180 C and thermal recuperation. Special cokes from hard coal are used as adsorbents. The properties of these adsorbents were tested with model waste gases and also with waste gases from a heavy fuel oil-fired furnace. The model waste gas had a composition of 0.3% by volume SO2, 3.0% by volume oxygen, 6.0% water, and 90.7% nitrogen. Of various adsorbents made from hard coal, cokes subjected to preliminary activation with 20 to 40% consumption achieved particularly high desulfurization efficiencies at 100 to 110 C. Efficiency was not reduced by short residence time of the gas. The SO2 binding capacity is about the same as found with lignite at a temperature of 70 C. The inner surface of the coke grew with the degree of consumption, until about 45% of the adsorbent was consumed. At high coke consumptions, adsorption efficiency drops.

10542 APTIC NO. 28697

Yanai, Hirochi, Tadanobu Hayashi, Tadashi Matsuda, and Takabumi Asano

REMOVAL OF SULFUR DIOXIDE BY CARBONACEOUS ION-EXCHANGING ADSORBENTS.

(Ion kokansei tansoshitsu kyuchakuzai niyoru aryusangasu no jokyo). Text in Japanese. Kogyo Kagaku Zasshi (J. Chem. Soc. Japan), 74(4):616-619, April 1971. 6 refs.

The effect of sulfuric acid-processing on the adsorption capability of granular activated charcoal and carbides of various carbonizatio temperature was studied. Granular activated charcoal Tsurume Coal 2GS of 2 mm diameter was mixed with concentrated sulfuric acid and processed for 2 hrs at 100, 150, 190 and 230 C. Also, saw and chip dusts were carbonized for 2 hrs in nitrogen gas at 400-900 C. The resulting granular charcoal of 10-24 mesh was processed by sulfuric acid in the same way. A fixed layer desulfurization reactor was employed for the experiment. At all reaction temperatures, the desulfurization capability was extremely improved. The amount of sulfur adsorbed by the sample was proportional to the half power of oxygen partial pressure and linear to sulfur dioxide partial pressure. The affinity to sulfuric acid was improved by the sulfuric acid-processing. About 0.05 microgram mol/g of the gas was adsorbed on the sample irrespective of the reaction temperature. The amount of sulfur adsorbed had an optimum at 50-100 C; it decreased linearly at highe temperatures, showing a change in reaction mode. Scanning electron micrographs showed a rapid increase in specific surface area at elevated processing temperatures. The amount of desulfurization was a logarithmic function of the total exchange capacity and specific surface area. This means that the desulfurization efficiency of the carbonaceous ion-exchanging adsorbents is proportional to the temperature of processing by sulfuric acid.

10543 APTIC NO. 28699

Russell, D. R.

AIR POLLUTION AND THE MOTOR VEHICLE--WHAT NEXT? Petrol. Rev., 25(291):103-113, March 1971. 59 refs.

Emission control systems for gasoline powered vehicles follow two basic principles: to prevent the pollutant from forming, and to destroy the pollutant after formation. The first principle entails making various modifications to the induction system and combustion chamber to enable the engine to run acceptably at weak mixtures; the second principle involves injectio of additional air into the exhaust manifold so that the oxygen-deficient gases leaving the combustion chamber undergo further oxidation in the exhaust manifold. Legislation concerning automobile emissions of hydrocarbons, carbon monoxide, and nitrogen oxides is mentioned for both the United States and Europe. Control of blow-by emission is possible using a crankcase ventilation system which feeds the gases back into the induction manifold to be consumed in the engine. Control of evaporative losses when the car is stationary is achieved either by absorption in a charcoal filled canister or by storage in the crankcase where the gasoline vapors can be partially absorbed in the engine oil. Stored vapors are then ducted to the intake manifold where they can be consumed during subsequent engine operation, together with the hydrocarbons evaporated while the engine is running. Exhaust emission control systems may rely on improved mixture distribution, improved combustion conditions, or an exhaust manifold air injection system. Future emission control is discussed, as well as methods to obtain maximum power from the engine. Catalytic devices are mentioned, and particulate control is reviewed. Alternative power sources which are indicated include turbines and electric cells. Fuel quality and the reduction of lead are cited. Alternative fuel systems being investigated in the U. S. include compressed natural gas, liquefied natural gas, and liquefied petroleum gas.

10544 APTIC NO. 28700

Sarto, Jormo O.

EVAPORATIVE EMISSION CONTROL SYSTEM.

(Chrysler Corp., Highland Park, Mich.) U. S. Pat. 3,554,175. 6p., Jan. 12, 1971. 3 refs. (Appl. Dec. 8, 1969, 5 claims).

A system for controlling evaporative emissions from the fuel system of a motor vehicle is presented. The fuel tank and carburetor bowl are vented to the crankcase of the engine so that the crankcase serves as an accumulator to collect fuel vapors from the fuel tank and fuel bowl while the engine is turned off; the crankcase is in turn vented to the engine intake so that the collected vapors are subsequently burned in the engine during operation. Venting of the carburetor bowl to the crankcase is selectively controlled by a valve. (Author abstract modified)

10545 APTIC NO. 28709

Husmann, Klauss and Gernot Haenig

THE GRILLO-AGS-METHOD FOR DESULFURIZATION OF WASTE GASES.

(Das Grillo-AGS-Verfahren zur Entschwefelung von Abgasen). Text in German. (Brennstoff-Waerme-Kraft, 23(3):85-91, March 1971.

The Grillo-AGS-method for desulfurizing waste gases is based on wet absorption of sulfur dioxide on an absorbent composed of magnesium and manganese oxides. This level combination of an alkaline component and a heavy metal has the advantage that the alkaline fraction acts as the absorbent and the heavy metals as the oxygen donator. A high activity is obtained by this interaction. More than 90% of the SO2 and the SO3 of the waste gases are bound by the absorbent in the form of sulfate and sulfite The efficiency of this method was tested on an oil-fired boiler furnace. For intense contact between the flue gas and the absorbent, a ratio of 0.7 l/cu m suspension flue gas was needed. The contact time ranged from 0.46 to 1.4 sec. A desulfurization efficiency of 85 and 90%, sometimes 95%, was obtained. Experiments to determine the efficiency of the method fo selective removal of SO3 and fluorine yielded 100% removal of SO3 and removal of fluorine 70%. The Grillo-AGS-method is one of the most economical desulfurization methods available. It creates no secondary problems, such as waste-water treatment or disposal of the absorbent.

10546 APTIC NO. 28710

Takahashi, Satoru

EXHAUST GAS CLEANING DEVICE FOR INTERNAL COMBUSTION ENGINES.

(Suzuki Jidosha Kogyo Kabushiki Kaisha, Hamana (Japan)) U. S. Pat. 3,559,401. 21 p., Feb. 2, 1971. 6 refs. (Appl. Sept. 15, 1969, 9 claims).

A device is provided for internal combustion engines whereby the charge-loss gas is intercepted at a point immediately downstream from the exhaust port, caused to ignite, and thereby burn to reduce the harmful components of exhaust gas. Afterburners tend to be complicated and expensive, while requiring a considerable time for warming up after the engine is started. Air injection devices have the disadvantage of not being capable of causing ignition and combustion of gases at low temperatures. The present device is characterized by the combination of a spark plug having a spark gap disposed in the exhaust gas outlet passageway of each engine cylinder at a point immediately downstream from the exhaust port and ignition means to cause the spark plug to spark immediatley after full closure of the exhaust port during the compression stroke of that cylinder. A small quantity of supplementary fuel-air gas can be supplied as pilot gas with or without supplemental air to the spark gap to facilitate and ensure positive ignition and combustion.

10547 APTIC NO. 28711

Mod, William A., John J. Newport, III, and Oliver Osborn

SEPARATION OF MAGNESIUM AND CARBON MONOXIDE VAPORS.

(Dow Chemical Co., Midland, Mich.) U. S. Pat. 3,560,198. 2 p., Feb. 2, 1971. 6 refs. (Appl. Aug. 14, 1967, 6 claims).

A difficulty inherent in the carbothermic reduction method for formation of magnesium metal is the separation of the carbon monoxide and magnesium vapors formed in the process. Separation by the traditional shock-cooling process, involving rapid quenching of the vapor mixture with hydrogen, methane, and oil sprays is neither economical nor efficient. A new method is described that allows substantially complete separation of the vapors at temperatures normally encountered in the carbothermic reduction of magnesium oxide containing ores. The method comprises contacting the vapor mixture of magnesium and carbon monoxide (at 1500-1850 C) with a purification bed consisting of appropriate metal carbides (aluminum carbide, thorium carbide, uranium carbide, lanthanium carbide, calcium carbide, strontium carbide, barium carbide, beryllium carbide, and their mixtures). These carbides react with carbon monoxide to form metal oxides and carbon. At the indicated operating temperatures, the metal carbides and metal oxides are not reduced by the magnesium vapors. Neither do they volatize, melt, or fuse. Another characteristic of the metal carbides is that they can be regenerated by heating the resultant metal oxides and carbon to a temperature slightly greater than that of the separation temperature.

10548 APTIC NO. 28715

Endo, Torao

UNDERGROUND INCINERATOR.

(Chikashiki jinkai shokyaku sochi). Text in Japanese. (Assignee not given.) Japan. Pat. Sho 36-11725. 1p., July 27, 1961. (Appl. Sept. 19, 1959, claims not given).

An underground incinerator combined with a smoke scrubber is described. A hollow cone-shaped cup is installed in the combustion chamber the tip of which is connected to a duct leading to a pipe cooler. The conical cup is provided with a number of holes in its lower part. A rotary grate is provided at the bottom of the combustion chamber, under which is an ash storage tank. Running along the side wall of the furnace is an air intake pipe, one end of which opens at the ground surface and the other at the bottom of the combustion chamber. A smoke duct connects the cooler to the scrubber the discharge port of which is connected to a drainpipe. Between the cooler and the scubber is a suction pump which draws smoke and gas from the combustion chamber. The top cover of the combustion chamber is flush with the ground surface. Trash, fallen leaves, and other combustible wastes in the combustion chamber are set on fire at the lower part of the heap. Trash gradually falls into the conical cup through its holes and is burned with air taken in through the air intake pipe. Ash falls down into the ash storage tank through the rotary grate. Smoke and gas generated by incineration are pumped through the smoke ducts, the cooler, and then to the scrubber where they are mixed with continuously supplied water. Effluent from the scrubber is discharged to the drainpipe.

10549 APTIC NO. 28717

Lambert, Robert

AIR WASHER VIA ARTIFICIALLY PRODUCED ATMOSPHERE AND RAIN CONDITIONS.

(Assignee not given.) U. S. Pat. 3,559,379. 5 p., Feb. 2, 1971. 6 refs. (Appl. Nov. 29, 1967, 3 claims).

An improved apparatus is described for quenching and scrubbing a hot gas emitted by a stack. Most apparatus require that the input gas stream be admitted at the bottom of the apparatus, but above the bottom section where the downflowing scrubbing liquid collects. Thus, deposition of solid matter on the walls of the gas input duct may readily occur at the so called 'wet-dry-line', where the gas stream contacts liquid inside the duct. In the present invention, the incoming gas stream is directed first through a substantially vertical conduit section before passing to the inlet of the scrubbing facility. Means are provided in the conduit section to remove large burning particles and to lower the temperature to a suitable temperature for washing and scrubbing in the evaporator section.

10550 APTIC NO. 28718

Neumann, Gerhard Max

ROLLER BAND AIR FILTER ASSEMBLY.

(Delbag Luftfilter GmbH, Berlin (Germany)) U. S. Pat. 3,559,380. 5p., Feb. 2, 1971. 8 refs. (Appl. Nov. 13, 1968, 6 claims).

In automatic roller band filter assemblies for filtering air, the filter band passes from one bobbin in an upper portion of the assembly through an intermediate sealed filter portion to a driven bobbin in a lower portion of the assembly; the bobbin is driven by a motor associated with the lower section. It is often desirable to provide several filter units side-by-side driven by a single motor. The present invention makes this possible by an arrangement of motor and gear train on a frame member of the lower portion, by means of which the filter assembly can be positioned with maximum economy of space. The arrangement allows a plurality of band filter assemblies, when arranged side-by-side, to be driven by a single motor associated with one of the band filter assemblies. (Author abstract modified)

10551 APTIC NO. 28719

McCabe, James M.

BENCH STRUCTURE WITH BUILT-IN DUST COLLECTOR.

(Coe Labs., Inc., Chicago, Ill.) U. S. Pat. 3,559,383. 3p., Feb. 2, 1971. 7 refs. (Appl. March 3, 1969, 1 claim).

A laboratory bench assembly has been provided with a built-in dust collecting system. Mounted in a drawer of the bench table and arranged to move in and out of the assembly is the dust collecting hood. Dust and particles from grinding operations may be drawn into the ducts and through the exhaust hoods. The dust and particles will be intercepted and deposited on the outside surfaces of bag filters. Clean air will pass through the filters, over a vertical partition, through the blower, and into the silencer box. From the silencer box the air will be discharged through exhaust outlets. In flowing through the pedestal on which the bench table is mounted, the air will make three 180 deg turns which aid in the removal of dust and fine particles.

10552 APTIC NO. 28720

Audibert, Francois and Pierre Duhaut

RESIDUAL REDUCTION BY HYDROTREATMENT.

(Furansu sekiyu kenkyujo no suisokaho ni yoru zanyu no genryo datsuryu ni tsuite). Text in Japanese. Sekiyu Gakkai Shi (J. Japan Petroleum Inst., Tokyo), 14(3):195-197, March 1971.

Reduction and desulfurization of residual oil by a unique pretreatment process was studied, in addition to conventional fixed-bed hydrodesulfurization, to determine the best performance with proper consumption of hydrogen. A large amount of hydrogen is required in the usual hydrogenation with a high-cracking power catalyst, raising costs of the operation. Supplied oil is pretreated with hydrogen gas, cooled by a portion of recycled gas, and then passed through a catalyst bed. The residual recycled gas is used for the quenching in the reactor. The liquid products are sent to the distiller through a high-pressure separator, while the used, recycled gas is cleaned by heavy-distillate or ammonia and recycled by a compressor for circulation. The residual oil has comparatively large amounts of carbon, heavy metals, nitrogen, and sulfur. Improvement in desulfurization efficiency is expected by the addition of proper amounts of diluents. Nitrogen reduces the rate of hydrodesulfurization, while the metals directly affect the activity of the catalyst. Research was performed on the nature of the catalyst, with emphasis on charging it in the bed for activity and durability. Pretreatment improves the nature of the oil produced, increasing yield and fluidity. In the case of residual gasoline and gas oil, the contents are higher. With middle-class distillate, the amounts are the same as without pretreatment. The relationship between hydrogen consumption and total desulfurization is unchanged by the pretreating process. A high rate of desulfurization at lower operating temperatures can be expected due to pretreatment. The cycle term can also be increased. Residual oil ashes are caught not only on the surface of catalyst particles, but also in the interior of the catalyst.

10553 APTIC NO. 28725

NEW 'FIXED CRYSTAL' TYPE CATALYST FOR HEAVY OIL DESULFURIZATION DEVELOPED BY KOGAI SHIGEN KENKYUSHO.

(Juyu datsuryu yo no koteishogata shin shokubai - Kogai shigen kenkyusho ga kaihatsu). Text in Japanese. PPM (Japan), 2(4):54-55, April 1971.

Molybdenum and cobalt are combined together by means of gamma alumina to form a new catalyst which has a 20-30% higher desulfurization efficiency than EPO, a similar catalyst developed by Gulf Oil. This 'fixed crystal' type catalyst has been selected as the best from among 100 kinds of molybdenum-cobalt compounds experimentally manufactured by the research institute Kogai Shigen Kenkyusho. Further details on its chemical composition are withheld pending patent application; but, according to the results of a test in which the catalyst was applied to waste oil effluents of 1 l/hr, the new catalyst showed a 75% desulfurization efficiency for the oil containing 1% sulfur oxides and maintained the efficiency for 1000 hrs of continuous use. Usually, a desulfurizing catalyst performs its function at 350 to 430 C, so its performance efficiency is indicated by desulfurization percentage given at the initial temperature, 350 C, and the number of hours the initial desulfurization percentage is sustained. Therefore, the new catalyst did desulfurize the oil at a 75% desulfurization rate continuously for 1000 hrs at 350 C. The temperature was increased by 10 C to raise the catalyst activity only after 1000 hrs of use.

10554 APTIC NO. 28728

Masaki, Kenji and Hiroyuki Maruoka

APPARATUS FOR REDUCING HYDROCARBON CONTENT OF ENGINE EXHAUST GASES DURING DECELERATION OF AUTOMOBILE.

(Nissan Motor Co., Ltd., Yokohama (Japan)) U. S. Pat. 3,554,173. 13p., Jan. 12, 1971. 6 refs. (Appl. Dec. 5, 1968, 13 claims).

A system is provided which is capable of reducing the hydrocarbon content of engine exhaust gases produced during deceleration of an automotive engine. An apparatus is included for maintaining the air-fuel ratio of the engine fuel mixture at a proper level during deceleration and at the same time reducing the intake manifold vacuum that increases as soon as the automobile slows down, whereby the total hydrocarbon content of engine exhaust gases emitted throughout the different modes of automobile operation is reduced to a minimum.

10555 APTIC NO. 28729

Beasley, Gearl L.

FLUE SMOKE INCINERATOR.

(Assignee not given.) U. S. Pat. 3,560,165 4p., Feb. 2, 1971. 5 refs. (Appl. Sept. 24, 1969, 4 claims).

A means is provided for initiating and maintaining burning of unburned hydrocarbons in suspension in a smoke stream. An upright housing forms a gas passageway communicating with the exhaust of a flue for receiving its heated gases. A heat exchanger, near the inlet of the housing, reduces the temperature of the flue gases and forms a fresh air chamber surrounding and communicating with the gas passageway. A fan moves atmospheric air through the heat exchanger and the fresh air chamber. Electrostatic precipitators require frequent maintenance and are relatively expensive, while secondary burners do not reduce the temperature of the gases and supply additional air.

10556 APTIC NO. 28730

Yokohama City Health Bureau (Japan)

AUTOMOBILE EXHAUST GAS COUNTERMEASURE WHICH MADE THE START - ENVIRONMENTAL STANDARD ON CARBON MONOXIDE DETERMINED.

(Ugokitashita jidosha haiki gasu taisaku--Issanka tanso kankyo kijun kimaru). Text in Japanese. Kenko na Hama (Healthy Hama), no. 34, 4p., May 1970.

Automatic exhaust gas monitors will be set up at 4 points in Yokohama City, and the measured concentration of exhaust pollutants will be telemetered to a central station. The environmental standard for carbon monoxide is less than 20 ppm for 8 successive hrs and less than 10 ppm for 24 successive hrs. To maintain these standards, carbon monoxide emissions during idling are set at 5.5% for small cars; 3.0% for light vehicles; and less than 1.5% for LPG cars. Used cars can pass these requirements through carburetor adjustment. The telemeter system in Yokohama will relay information not only on carbon monoxide, but also on hydrocarbons, nitrogen oxides, and dust. At the central station data processing equipment will analyze hourly changes in concentrations, minimum and maximum averages and whether or not the value is within the environmental standard. In addition to the telemeter system, measurement cards will travel around the city, automatically recording four items; carbon monoxide, hydrocarbons, dust, and nitrogen oxides. Sulfur dioxide and wind direction and velocity will also be measured. All the vehicles used by the city, health centers, and hospitals are equipped with catalyst-type exhaust gas purification devices. Since 1966, about 300 privately owned cars have been equipped with exhaust gas purification devices. Pollution rates measured at busy intersections are reported to the Ministry of Health and Welare, which confers with the Ministry of Transportation over the control of emissions of from new and old cars. Some intersections in Yokohama have exceeded the 20 ppm level. However, the environmemtal standard for lead, tentatively 5 micrograms/cu m, is not often exceeded.

10557 APTIC NO. 28732

Sakai, Yasuo, Naomi Tokura, Saburo Tsutsumi, and Kosaburo Mukai

INFLUENCE OF ENGINE DESIGN FACTORS ON EXHAUST EMISSION FROM AUTOMOTIVE GASOLINE ENGINE.

(Engin shuyo shogen ga haishutsu gasu nodo ni oyobuso eikyo). Text in Japanese. (Jidosha Gijutsukai Ronbunshu Proc. Soc. Automotive Engrs.), no. 1:16-21, Nov. 1970. 3 refs.

A commercial single cylinder engine was studied for the effects on exhaust emission of the following design factors: changing piston displacement, stroke bore ratio, and compression ratio. A Nissan engine was used for experiments, involving five combinations of bore stroke ratios and on three stroke bore ratios. In a comparative experiment on compression ratio in a standard engine, five compression ratios were investigated. Rotation speed and negative charge were considered to cover the main part of the operating range of multicylinder engine, and exhaust gas was collected at a point 20 cm behind the exhaust valve of the exhaust port exit. A nondiffusive type infrared analyzer and a hydrogen flame ionization detector were used for gas analysis. These engine design factors determine the combustion chamber S-V ratio (combustion chamber surface area volume ratio); hydrocarbon concentrations tend to increase and nitrogen oxide concentrations to decrease in proportion to this S-V ratio. For lower hydrocarbon concentrations except for extremely short stroke, compression ratio should be low, stroke long, and piston displacement per cylinder high. For lower nitrogen oxide concentrations, compression ratio short stroke and piston displacement per cylinder should be low.

10558 APTIC NO. 28734

Ministry of International Trade and Industry (Japan), Bureau of Public Nuisance and Safety

HANDBOOK OF INDUSTRIAL PUBLIC NUISANCE CONTROL DEVICES AND FACILITIES.

(Sangyokogai shori kiki yoran). Text in Japanese. Public Nuisance Control Assoc., Tokyo (Japan), 216 p., 1971.

The handbook of industrial public nuisance control devices and facilities consists of legislative and administrative material related to public nuisance. Environmental standards for air, water, and noise pollution, special public nuisance control districts, financial subsidy to industries for the installment of nuisance control facilities, tax schemes, and local legislation concerning nuisances are some of the topics discussed. The section on air pollution includes introductory material concerning the general control technology such as dust collection, treatment of toxic gases, sulfur dioxide control, smoke emission control, and diffusion. Various control devices and facilities manufactured by different companies are listed with diagrams, suggested uses, characteristics, and basic design and structure. Smoke measurement devices, UV SO2-analyzers, anemometers, gas chromatographs, and gas analyzers are introduced.

10559 APTIC NO. 28741

Tomoto, Hiroshi, Kaoru Sato, Isao Nagaishi, T. Azuma, T. Irie, K. Hiramatsu, K. Hamano, T. Yoshida, and T. Hasegawa

STUDY ON THE INCINERATOR FOR POLYVINYL CHLORIDE.

(Enbi shokyakura no kenkyu). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):168, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

An experimental furnace was constructed to study the incineration of polyvinyl chloride. The furnace consists of an incineration chamber with an exhaust gas treatment and cooling device at the top. Polyvinyl chloride is fed in by a belt conveyor and is burned in an oil burner. Combustion chamber temperature, composition of combustion gas, chlorine gas concentration, and pH and temperature were studied. The gas-cooling methods tested were spraying of water, water recycling, recycling of slaked lime solution, and mixed combustion of vinyl and slaked lime. When the loading of the chamber exceeded 500,000 Kcal/cu m/hr, the occurrence of black smoke was extensive. At an excess oxygen rate of 1.26 or over, the smoke turned white. Sprays of water or slaked lime solution removed up to 81-85 % of the chlorine components.

10560 APTIC NO. 28742

Oiwa, Tatsukazu

METHOD OF EXTRICATION SULFUR FROM EXHAUST SMOKE BY AMMONIA.

(Anmonia gasu ni yoru haien datsuryuho). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):173, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

The KD Smoke Desulfurization System installed in the 26-story Kobe Commercial Trading Center building in November 1969 is claimed to remove 99.45% of the sulfur in boiler combustion gas. Waste gas leaving the boiler at 270-320 C is sprayed with ammonia gas and water to produce (NH4)2SO3 or (NH4)2SO4. The gas is then cleaned in a spiraely rotating scrubbing chamber to remove sulfur oxides, ashes, and other water soluble matter by adsorption. The spiral rotation chamber is characterized by the fact that isobaric centrifugal force during rotation creates a thin liquid film on the surface of the filter and removes the impurities in the waste gas. Studies are currently in progress on the reclamation of the sulfur oxides as ammonium sulfate or even as mirabilite.

10561 APTIC NO. 28743

Kambe, Ryuzo

AIR FILTER FOR THE CONTAMINATION GASES.

(Taiki osen gasu no jokyo firuta). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):172, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

A newly developed air filter based on the principle of contact oxidation-adsorption by catalysts is claimed to be much more effective than active carbon filters. The catalyst contains mainly active manganese dioxide together with copper, silver, nickel, cobalt, chrome, and palladium or their oxides. The filter is made by treating the surface of unwoven fabric with the catalyst. The pressure loss of the filter is only about one-half that of a granule-loaded filter. By cutting the original filter cloth into appropriate sizes, the filtration method is applicable from households to industries.

10562 APTIC NO. 28744

Kato, Keiji, Goro Yoshikawa, and Tadao Nakamura

THE REPORT OF THE BASIC EXPERIMENTS DATA FOR PRACTICAL USE OF A. C. ELECTROSTATIC PRECIPITATOR.

Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):170, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

Basic experiments were conducted on a new alternate current electrostatic precipitator. Dust collection efficiency, flow-through wind speed, and wind pressure loss were measured by feeding a test powder into the intake duct and by attaching a digital dustmeter. Because of the loading of alternate current voltage on the discharge wire, even particles below 0.3 micron were collected. Thus the dust collection rate of the device was much higher than that of other precipitators. The collection efficiency measured by the digital dustmeter was also compared to the results obtained by colorimetry.

10563 APTIC NO. 28746

Kuwata, Tsutomu, Yutaka Oguchi, and Hirotsugu Nomura

HYDRODESULFURIZATION OF PETROLEUM HYDROCARBONS CONTAINING ASPHALTENES.

(Nippon Oil Co., Ltd., Tokyo (Japan)) U. S. Pat. 3,546,104. 9p., Dec. 8, 1970. 6 refs. (Appl. May 8, 1968, 10 claims.)

A petroleum hydrocarbon containing asphaltenes is contacted with hydrogen and a catalyst, which is either an amorphous alumina or silica-alumina carrier, with a metal, such as, copper, platinum, nickel, cobalt, or molybdenum. The carrier is obtained by gelling an aqueous colloidal solution of basic aluminum sulfate having the composition represented by the formula, Al2O3(0.8-1.6)SO3 or a mixed solution of basic aluminum sulfate and an aqueous sol of silica at a temperature of 40-100 C to form hydrogels. Water is added to the hydrogels to adjust the molar ratio of Al2O3:SO3 to 1:0.4-0.7 and the hydrogels are then treated with a base to remove the sulfate radicals. The carrier and metal component are calcined at 350-800 C. (Author abstract modified)

10564 APTIC NO. 28747

Miura, Mitsugu

NEW EXTRICATOR OF SULFUR AND DUST 'TOTEM POLE'.

(Atarashii datsuryu datsujinkin totemu poru). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):175, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

A new desulfurization precipitator, the 'Totem Pole' is claimed to create only about 1/30-1/50 of the amount of waste water produced by conventional wet-type devices. The device consists of a series of top-sealed and bottom-open cylinders with vertical slits open to the tangential direction and covered by an outer cylinder. Wind speed at the slit is as high at 15-30 m/sec, and when the scrubbing liquid at the bottom is forced up along the inner surface of the cylinders by incoming contaminated air, it is dispersed into fine mist by the slits. This leads to good contact between the polluted air and the scrubbing solution. Much less solution than usual is required, since an amount necessary to form a thin layer along the cylinder wall is sufficient. At the top of the Totem Pole, a gas-liquid separator separates the cleaned air and the liquid, which is purified by a cyclone and is returned to the bottom. Reportedly, the device removes 80-90% of particulates under one micron.

10565 APTIC NO. 28748

Ishinishi, N., Yasushi Kodama, and Yoko Katori

AN EXPERIMENTAL STUDY IN REDUCING THE CONCENTRATION OF SO2 IN AMBIENT AIR.

(Taiki chu aryusan gasu jokyosochi ni kansuru jikkenteki kenkyu). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):176, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

Scrubbing solutions for a newly developed small sulfur dioxide removal device for indoor use were studied together with the rate of SO2 removal. Polluted air is drawn into the device by a fan, then passed through 10 liters of scrubbing solution, and subsequently discharged indoors. Standard SO2 gas was fed into the device, and the concentration of SO2 at the outlet measured by the p-rosaniline-formalin method. With hydrogen peroxide as the scrubbing solution, SO2 removal was over 90%, but the period of effective removal was curtailed by an increase in the concentration of SO2. This was inferred from the amount of hydrogen peroxide left over after a certain period of operation at a certain concentration of SO2. When an alkaline solution (2% sodium carbonate) was used, the change in pH was very gradual and the removal rate was 94.1% even after 48 hours. As long as the solution stays alkaline, the removal rate can be expected to be over 90%.

10566 APTIC NO. 28749

Nagami, K., K. Minemura, I. Shoji, Y. Noguchi, S. Nishimura, K. Mashimo, and K. Baba

METHODS OF PURIFICATION FOR OIL-BURNING BOILER.

(Juyudaki danboyo boira haien no datsuryu sochi no tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):174, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

A new, simple waste gas desulfurization devide was developed for exclusive use on heating boilers. The method used is the wet type; since the water supply is quite limited for heating boilers, an alkaline solution is substituted for water. The device consists of a drum rotating around the horizontal axis, waste gas to be treated entering the drum in a tangential direction. The nozzle in the device sprays the alkaline solution. The heavy oil used for combustion was B-heavy oil with 1.77% sulfur content. The rpm of the rotating drum and the size of the nozzle aperture are not related to the sulfur dioxide removal efficiency of the device. When the flow rate of the waste gas increased, the removal rate declined, and therefore, the amount of solution had to be controlled to match the amount of gas passing through. Recycling of the treatment solution was very effective, and over a period of about 9 hrs more than 95% of sulfur dioxide was removed from the waste gas.

10567 APTIC NO. 28756

Tohata, Heiichiro and Seitaro Kato

THE TREATMENT OF THE WASTING GAS BY THE COMBUSTION OF PVC COATING WIRE.

(Enbi hifukudensen no nensho ni yori haishutsu suru akushu no jojyoho). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):169, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

Catalytic methods of deodorizing waste gases from the combustion of polyvinyl chloride were investigated. Polyvinyl chloride for electric wire insulation was combusted in an electric oven at 350 C. The gas was then scrubbed with water to remove hydrochloric acid, and the resulting gas was brought into contact with the following catalysts: active bauxite containing active alumina and iron oxide; alumina; and stainless steel. The strength of odor before passage of the gas through the catalytic layer was 2500 5000; for all types of catalysts, the odor was considerably reduced The effectiveness was in the order of bauxite, alumina, and stainless steel. The good result obtained with bauxite is apparently due to the catalyst's iron oxide content.

10568 **APTIC NO. 28760**

Tumanovskii, A. G., V. A. Khristich, and A. M. Shevchenko

INFLUENCE OF THE TYPE OF BURNER ON FORMATION OF OXIDES OF NITROGEN IN THE COMBUSTION CHAMBERS OF GAS TURBINE PLANTS WHEN BURNING NATURAL GAS.

Thermal Eng. (English translation from Russian of: Teploenergetika), 17(5):48-52, May 1970.

Investigations were conducted on a 1:2.5 scale model of a commercia gas turbine combustion chamber to determine the influence of the type of burner and mixing process on emissions of nitrogen oxides at the chamber outlet. In combustion of natural gas in gas turbine plant combustion chambers with the primary excess air factor less than 1, the yield of nitric oxides increases a little, and the most effective method for controlling their formation is to maintain the furnace with an air factor between 1.8 and 2.0. Other conditions being equal, the nitric oxide yield depends on the process of mixture formation, and, therefore, on the design of the burner unit. A decrease in the amount of fuel gas supplied to the pilot burner leads to a decrease in nitric oxides in the plant exhaust. Nitric oxides can also be reduced by improving the process of mixture formation in the primary zone of a diffusion-flame burner with central gas distribution, at an air factor of 1.8-2.0, by selecting an optimal depth of penetration of the gas jets. A minimum quantity of nitric oxides results from using a jet stabilizer burner without registers, which is capable of operation with higher excess air factors, sets up a uniform distribution of fuel gas over the cross section of the combustion chamber, and ensures intensive mixing of gas and air. In the case of vibrating combustion, the concentration of nitric oxides at the combustion chamber exhaust outlet decreases a little with increase in the amplitude of pressure fluctuations. (Author conclusions modified)

10569 **APTIC NO. 28774**

Odaira, Toshio, Yasuo Iida, Kimio Kubota, and Junji Kutsuma

RESEARCH ON PREVENTION OF DIESEL AUTOMOBILE BLACKSMOKE.

(Diesel jidosha kokuenboshi ni kansuru shiken ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):260, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

The effects, if any, of barium in fuel additives for suppressing black smoke emissions from diesel engines were investigated. Bench tests were conducted on diesel engines using 26 kinds of smoke reduction additives. Those containing barium were relatively more effective. The greater the barium content, the greater the reduction of smoke. Reduction was not related to driving conditions. Also, the amount of carbon monoxide and nitric oxide emissions was hardly influenced by the additives (hydrocarbon emissions require more study). Furthermore, a Tokyo Metropolitan Transit bus operating with fuel additives did not show any noticeable effects after a 10,000 km test run.

10570 **APTIC NO. 28780**

Ehama, Goro

WELDING MASK WITH FUME EXTRACTION FACILITY.

(Yosetsuji ni okeru yosetsu fyumu bojoki). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):167, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

A welding mask for a fume extraction facility is described; it does not have the disadvantages of dust-proof masks, which do not remove all the toxic substances and which hamper the freedom of the user, or the disadvantages of the traditional localized exhaust system, in which the removal of the fume is not accomplished when the welding point moves around. The new device is constructed so that the position of the hood changes according to the motion of the welding rod. Since the fume is completely removed by the device, the welder has a much wider field of vision. In addition, the mask provides shield against the flying sparks and hot blast, thus preventing the softening of the hose and damage to the fan.

10571 **APTIC NO. 28782**

Kato, Keiji, Goro Yoshikawa, and Tadao Nakamura

SOME PROPERTIES FOR TRIAL WORK OF A.C. ELECTROSTATIC PRECIPITATOR.

(Koryu shiki denkishujinki shisaku seihin no tokusei ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):171, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

Basic research was conducted on a new alternating current electrostatic precipitator. Since the device uses alternate current, the amount of ozone created when AC 7-11 KV is loaded on discharge cable was measured by the potassium iodide method. Detection of ozone was accomplished by means of an arsenous acid titration solution. In addition, the amount of electrically charged dusts not removed by the precipitator was measured by installing filters and vinyl sheets in the duct behind the precipitator. The amount of generated ozone was not significant enough to invalidate the use of alternate current precipitators.

10572 **APTIC NO. 28784**

Hayashi, Hideo, Sataro Iwasaki, Hitoshi Minohara, Toshio Hasegawa, and Shigehiro Hirao

ON THE METHODS OF VARIOUS DUST COLLECTORS USED IN INCINERATORS.

(Obutsu shokyakuro no shujinhoho ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):186, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

Different types of incinerators were studied to better understand the dust collection problem in the incineration process. The batch-type furnaces investigated were usually provided only with simple sprays and in many cases the dusts were over the legal limit of 0.78 g/N cu m. In semi-mechanized furnaces, the effects of spraying were apparent as were those of dust collection by a centrifugal precipitator; however, the white vapor from the heated scrubbing water tended to obstruct the view. The efficiency for completely mechanized incinerators is rated at about 50-80%, but it seemed that only relatively large particulates were captured. Scrubbing-type precipitators are known to have efficiencies over 50-80%, but scrubbing by water tended to lower the smoke temperature and thus lowered the effective stack height. Electrostatic precipitators showed good results; but at some facilities, due to slack maintenance, the efficiency was down to about 60-80%. The conclusion is that abatement of the visual unpleasantness (which cannot be solved by a centrifugal precipitator) requires the use of electrostatic precipitators.

10573 APTIC NO. 28792

CANADA'S COPELAND SYSTEM MAKES INROADS INTO HOME MARKET.

Water Pollution Control (Toonto), 109(3):14-15, 1971.

The Copeland system is a fluid bed process for incinerating any solid or liquid waste containing heat energy. The process uses a bed of solid particles that are kept in a state of agitation and partial suspension by a stream of gas (or air) forced into the bed through orifices. This causes chemical reaction or combustion to take place at the desired temperature. The system employs scrubbing and absorption stages for removal of all particulate matter and undesirable oxidized gases. Heat values are recoverable as steam from the gases in a waste heat boiler, or as hot water in a scrubbing stage. In addition, valuable inorganic chemicals are reclaimed. Applications of the process include pulp mills, oil refineries, oil shale, distilleries, chemical plants, and sewage sludge.

10574 APTIC NO. 28796

THE GRILLO WASTE GAS DESULFURIZATION METHOD.

(Das Grillo-Abgas- entschwefelungsverfahren). Text in German. Chem. Rundschau (Solothurn), 24(1):6, 1971.

The Grillo waste gas desulfurization method operates on the principle of wet absorption of the sulfur compounds. The waste gases are brought into contact with an aqueous suspension of a magnesium-manganese oxide mixture. The sulfur-loaded wet suspension is then dried and passed to a regeneration station. For the regeneration process, existing roasting plants of sulfuric acid factories can be used. The sulfuric acid obtained from the process can be sold. The spent absorption mass can be recovered from a number of desulfurization processes in one central recovery plant. This would relieve power plants or ore sintering plants from simultaneously producing sulfuric acid. The costs for flue gas desulfurization range from $.00025 to .00038/kWh for larger power plants. The method has been tested in a pilot plant for 27,000 cu m waste gas/hr attached to an oil-fired power plant.

MEASUREMENT METHODS

10575 APTIC NO. 27887

Candeli, A. and G. Morozzi

THE PROBLEM OF THE CANCEROGENICITY OF POLLUTED AIR. III. A RADIOACTIVE TRACER TECHNIQUE FOR THE QUANTITATIVE DETERMINATION OF AROMATIC POLYCYCLIC HYDROCARBONS.

(Il problema della cancerogenicita dell'aria inquinata: III. Tecnic dei traccianti radioattivi per la determinazione quantitativa degli idrocarburi aromatici policiclici). Text in Italian. Giorn. Igiene Med. Prevent. (Genoa), 10(1):3-15, Jan.-March 1969. 20 refs.

A tracer technique using 3,4-benzopyrene-H(3) was developed to determine the extent to which 3,4-benzopyrene is lost in column chromatography and paper chromatography. The H(3)-labeled benzopyrene, determinable by the liquid scintillation counting technique, was added to a solution of known quantity of pure aromatic polycyclic hydrocarbons as an internal standard and quantitatively determined at the beginning and end of the analysis. The experiments show that the recovery percentage of tritiated 3,4-benzopyrene corresponds, within acceptable limits, to the recovery percentage of untritiated 3,4-benzopyrene and to that of the other polycyclic hydrocarbons used in the experiments. The loss of such compounds is about 30% after column chromatography and about 50% after paper chromatography. Analysis of particulate matter in a gasoline engine exhaust gas indicated a loss of the tritiated compound which was similar to that for mixtures of pure aromatic polycyclic hydrocarbons. (Author abstract modified)

10576 APTIC NO. 27902

Crawford, Allen R. and George V. Dyroff

AN EVALUATION OF METHODS FOR DETERMINING SULFUR IN FUEL OILS.

Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 33p., 1970. 9 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 63rd, St. Louis, Mo., June 14-18, 1970, Paper 70-46.)

The precision of six methods for determining a wide range of sulfur content in fuel oils was evaluated: the bomb method, the quartz tube method, the high temperature method, x-ray spectrograph, microcoulometry, and flask combustion (Schoniger). Four samples of distillate fuel oil with sulfur contents ranging from 0.2 to 1.4% sulfur were tested. To minimize sample variations within a given concentration, the bulk samples were mixed in a heated blender and the test sample containers were filled while the mix process was going on. The precision estimates showed that the precision standard deviations generally increased with increasing sulfur concentration. The x-ray spectrograph method was superior to all other test methods over the range of sulfur levels tested. The operator contribution to the overall variability was very low on the quartz tube, high temperature, x-ray spectrograph, and microcoulometry methods. However, for the bomb and Schoniger methods, operator variation was about equal to the contribution due to days. On all methods except the x-ray spectrograph, the repeatability variance (calculated from replicate tests on a sample by an operator within a day) was almost as large as the between days variance (calculated from replicate tests on a sample by an operator over several days). Thus the inherent test method precision showed little deterioration over time periods of several days.

10577 APTIC NO. 27921

Spevak, Antonin and Vaclav Kratochvil

RAPID SEMIQUANTITATIVE DETERMINATION OF PHOSGENE CONCENTRATION IN THE AIR.

(Rychle semikvantitatiuni stanoveni koncentrace fosgenu v ovZdusi). Text in Czech. Chem. Prumysl (Prague), 15(11):682- 685, 1965. 25 refs.

A new method was developed for detection of phosgene in the atmosphere. It is based on a reaction of phosgene with p dimethylamino-benzaldehyde and m-dimethylaminophenol. Silica gel impregnated by the cyclohexane solution of the last two turns violet-blue in the presence of phosgene. The odor change is relatively steady and easily observable. Sensitivity of detection is 0.2 micrograms/l. Silica gel preparation is described After impregnation, it is filled into glass tubes. In the presence of hydrochloric acid elementary chlorine, the reaction is not specific. In that case, an additional layer composed of silica gel impregnated with 4% sodium iodide solution and 10% sodium thiosulfate solution is added preceding the detection layer. The method is suitable for phosgene detection in chemical plants. Other commonly used methods of phosgene detection are discussed.

10578 APTIC NO. 27927

Nielsen, H. M.

DETERMINATION OF MICROGRAM QUANTITIES OF FLUORIDE.

Anal. Chem., 30(5):1009-1011, May 1958. 10 refs.

The determination of trace amounts of fluoride in the quantities found in some animal tissues is difficult, especially when the sample size must be restricted. By employing an ion exchange technique for concentrating the fluoride and freeing the solution from interfering ions, 1 to 10-gamma quantities can be estimated with a precision within 5% of the fluoride present. The procedure involves suspending a portion of anion exchange resin in chloride form in distilled water, decanting the fines, and adding the resin slurry to borosilicate tubes to make columns 2 cm in height. The resin is converted to acetate form by the addition of sodium acetate to the column, and the fluoride is removed from the resin by stepwise elution with increasing concentrations of sodium acetate, beginning at 0.1M solution. Effluent is collected in 5-ml fractions and absorbances are read in a spectrophotometer at 527.4 micrograms. Fluoride values are determined from a curve prepared by plotting absorbance readings of standard fluoride solutions made to volume with 0.2M sodium acetate solution against the concentration of fluoride. Fifty to 70 ml of 0.2M sodium acetate are required to remove interfering phosphate and 25 ml of 1M acetate to remove chloride and sulfate. Then the method is applied to the determination of fluoride in atmospheric samples, the samples need only be percolated through the resin. The fluoride is removed and estimated as outlined above.

10579 APTIC NO. 27933

Rowley, R. J., J. G. Grier, and R. L. Parsons

DETERMINATION OF FLUORIDE IN VEGETATION.

Anal. Chem., 25(7):1061-1065, July 1953. 4 refs. (Presented at the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Pittsburgh, Pa., March 2-6, 1953).

There has been a general belief that fluoride can be satisfactorily recovered from ashed vegetation by double distillation, first with sulfuric acid, then with perchloric acid. Measurement of the fluoride is usually based on the reaction between fluoride and thorium nitrate in the presence of sodium alizarinsulfonate indicator. Recent work has shown that ashing of vegetation containing appreciable amounts of silica may result in unreactive combinations of fluoride, from which fluoride cannot be separated. Two modifications of eliminating low recoveries resulting from fixation associated with the ashing treatment are alkali fusion of ash and collection of 500 ml of distillate. These procedures, which are described in detail, were applied to synthetic vegetation samples (grass hay, red clover hay, timothy, and apple leaves) to which fluoride was added. The percentage recoveries are listed and noted to be satisfactory. Alkaline fusion completely liberated the combined fluoride, while a single distillation with perchloric acid was adequate for isolating the fluoride in a form suitable for measurement. The modifications described thus offer appreciable savings in time as well as increased accuracy.

10580 APTIC NO. 27934

Leonardos, Gregory, David A. Kendall, and Elaine R. Rubin

THE ROLE OF BACKGROUND ODOR IN AFFECTING THE PERCEPTION OF ODORANT CHEMICALS.

Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 33p., 1970. 3 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 63rd, St. Louis, Mo., June 14-18, 1970, Paper 70-23.)

The effect of various background odors that may exist in the environment on the perception of odorant chemicals has not been fully evaluated in a systematic manner. The information presented reports on the effects that various low-intensity background odors might have on the recognition odor threshold concentration and the perception of supra-threshold concentrations of odorant chemicals. Additional data is developed on the odor character and intensity of selected odorant chemicals as their concentration is increased above threshold levels. The odorant chemicals studies included methyl isobutyl ketone, toluene, ethyl acrylate, ethyl mercaptan, p-chlorophenol, diphenyl ether, hydrogen sulfide, and pyridine. The odor properties of these chemicals were evaluated against low odor intensity backgrounds that included a minimal odor background as the control, a simple chemical background (hydrogen sulfide or sulfur dioxide) and complex backgrounds (gasoline, diesel exhaust or cigarette smoke). The recognition threshold concentration for methyl isobutyl ketone ranged from 0.25 ppm (0.1 ppm SO2 background to 6.3 ppm in a low-level diesel exhaust background. Methyl isobutyl ketone (concentration range of 0.63 2.5 ppm) interacted with diesel exhaust background to produce a qualitative change in the odor quality. The recognition threshold concentration of ethyl mercaptan in a 1.0 ppm SO2 background was 0.025 ppb as compared to a threshold concentration range of 0.25 0.63 ppb in the other backgrounds studied. The range of thresholds determined for p chlorophenol was 0.025 ppb (activated carbon-treated air) to 1.0 ppb in diesel exhaust. The similarity of odor quality (burnt) of diesel exhaust and p-chlorophenol may explain the higher threshold for p-chlorophenol observed in diesel exhaust. In certain instances, background odor can have an effect on the perception of odorant. It appears that the likelihood of this occurring is enhanced if the odorant and background have similar odor descriptions or if the background is complex. It does not appear to be possible to predict the effect that background odor might have on the perception of specific odorant chemicals. Because of the complexity of the problems of odorant interaction, it is almost impossible to draw firm conclusions from the limited data available. (Author abstract modified)

10581 APTIC NO. 27936

Withstandley, V., W. J. Moroz, and G. W. Anderson

A PORTABLE, BATTERY-OPERATED, IMMEDIATE-READOUT DUST-PARTICLE ANALYZER.

Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 22p., 1970. 1 ref. (Presented at the Air Pollution Control Association, Annual Meeting, 63rd, St. Louis, Mo., June 14-18, 1970, Paper 70-126.)

A portable, battery operated, electro-optical dust analyzer operating on the principle of light-scattering from individual dust particles in air drawn through a high-intensity light field has been developed for monitoring dust levels where external power may be unavailable. The instrument counts and size-discriminates airborne particles over two size ranges upwards of 0.4 micron with immediate readout. A dilution mechanism permits analysis of particulate concentrations as high as 2400 particles/cu cm on each channel. The self-contained nickel-cadmium batteries are rechargeable. Total weight, including batteries and all components is approximately 14 lbs. Total power used, mainly for pumping a filtered air sheath at 300 cm/sec and for the light source, is less than 34 watts. Another unique feature is the flow system designed for turbulence suppression. Electronic calibration in terms of number of particles per cu cm for each size range is accomplished in the laboratory by means of a pulse generator with respect to which the readout indicator is calibrated for count. The input voltages to the pulse-height discriminators are appropriately attenuated for various pulse amplitudes simulating the output of the light-sensitive pickup, a photomultiplier tube. Pulse height as a function of particle size was measured for polystyrene latex beads ranging from 0.3 to 2 micron in diameter. Excellent correlation is obtained with results from commercial analyzers. Results of field surveys undertaken with the prototype analyzer at various sites in central Pennsylvania and at numerous sampling points within the cities of Pittsburgh and Philadelphia are presented. Particulate concentrations as high as 1400 particles/cu cm have been measured at a coal cleaning plant. (Author abstract)

10582 APTIC NO. 27946

Xintaras, C., B. L. Johnson, C. E. Ulrich, R. E. Terrill, and M. F. Sobecki

APPLICATION OF THE EVOKED RESPONSE TECHNIQUE IN AIR POLLUTION TOXICOLOGY.

Toxicol. Appl. Pharmacol., 8(1):77-87, Jan. 1966. 10 refs.

The evoked response to flash in the specific visual cortex and in the superior colliculus of unrestrained and unanesthetized albino rats bearing indwelling bipolar electrodes was investigated with the use of an on-line digital computer. Pentobarbital was used as a standard for comparing the depressant effects of carbon monoxide and ozone. A modified Skinner box was designed to permit the simultaneous measurement of behavioral and electrophysiologic responses and to serve also as a dynamic inhalation chamber. When the concentration of CO was 1000 ppm, the evoked response curves showed a striking similarity to those recorded after the injection of pentobarbital. There was an increase of the amplitude of the primary components, and a decrease in amplitude and an increase in latency of the secondary activity. While no significant change in lever-pressing was detected before and one hour and 40 minutes afte exposure to 100 ppm CO, definite changes in the activity of the brain were observed. In the collicular response, the increase in the amplitude of the first downward deflection was about 60% of the control value, as compared to an increase of about 80% in the experiment with 1000 ppm of CO. After a rat had inhaled 50 ppm of CO for 1 hour, the latency of the secondary component increased. At the same time, the amplitude of the first downward deflection increased by about 20% of the control value. A further increase in the amplitude of the first downward deflection (about 50% of the control) is observed after 2 hours, and the effect on the secondary component is one of increased latency and decreased amplitude. Whereas the alterations in the record of the response caused by CO and pentobarbital appear promptly, the effect of O3 is not observed until 1 hour after the exposure is initiated. One sees a decrease in the amplitude of the second upward deflection, and an increase in the latency of the secondary activity. A slight change in noted under these conditions, in the first downward deflection both in the visual cortex and in the superior colliculus.

10583 APTIC NO. 27949

Spurny, K.

MEMBRANE FILTER IN AEROSOLOGY II. FILTRATION MECHANISM IN MEMBRANE FILTERS.

(Membranfilter in der Aerosologie II. Filtrationsmechanismen bei Membranfiltern). Text in German. Zentr. Aerosol- Forsch. (Stuttgart), 12(6):530-545, Dec. 1965.

The fundamentals of the theory of filtration in aerodisperse systems, the filtration characteristics of membrane filters (including impaction separation on the surface of membrane filters, diffusion separation in capillaries, separation resulting from sedimentation and from blockage, the effect of electrostatic and of molecular forces, and the combined action of impaction and diffusion), the kinetics of aerosol filtration by membrane filters, and methods used in experimental studies of filtration characteristics of membrane filters are discussed. The percentage of aerosol particles retained by a given filter at a given velocity will decrease with increasing particle size because of the decreasing diffusion effect, and it will decrease with decreasing particle size because of the decreasing interception effect. Hence some size of aerosol particle will be more difficult to filter than any other size. The most penetrating size will not necessarily be the same for all filters. Quantitative study of filtration involves the study of the disperse medium (gas) the disperse particle (particles), and the porous material. The basic parameters defining filtration are filtering effectiveness and pressure drop. The characteristics of a filter can be determined theoretically by an analysis of appropriate equations an by experimental measurement. The most important characteristics of a filter are those indicating the dependence of filtering effectiveness on particle size of the filtered aerosol.

10584 APTIC NO. 27950

Hill, Uno T.

PHOTOMETRIC DETERMINATION OF BERYLLIUM.

Anal. Chem., 30(4):521-524 April 1958. 1 ref.

Existing methods for determining beryllium require chemical separations from interfering substances. Direct photometric method for trace amounts of beryllium in aluminum, steel, copper, titanium and mixed oxides are described. Berylliim reacts with Eriochrome Cyanine R to form a red complex having a maximum absorbance at 512 millimicron at pH 9.8. Addition of Versenate and cyanide eliminates interfering ions. The methods are rapid and accurate for beryllium concentrations up to 10 gamma in 25 or 50 ml of solution. (Author abstract modified)

10585 APTIC NO. 27962

Svoboda, Karel and Hans Ixfeld

SAMPLING AND AUTOMATED ANALYSIS OF GASEOUS FLUORINE IMMISSIONS.

(Probenahme und automatishche Analyse gasfoermiger Fluor- Immissionen). Text in German. Staub-Reinhalt. Luft, 31(1):1-8, Jan. 1971. 34 refs.

Gaseous fluorine compounds especially hydrofluoric acid are phytotoxic, air sampling thus must include all molecular disperse fluorine compounds after the removal of particulates. The electrometric fluorine determination using an ion-selective lanthanum electrode yields tests results in a form easily handled by digital computers. The electrode yields a potential which is equivalent to fluorine ion activity in the test solution washing the lanthanum fluoride membrane. Calcium fluoride or cryolite raise the potential only to the extent to which they go into solution. Metal ions present which would form fluorine complexes and thus reduce the fluoride ion activity are inactivated by a hydrochloric acid-citrate buffer of appropriate pH The standard potentials of individual lanthanum fluoride electrodes are not uniform and each electrode must be individually calibrated. A calomel electrode is used as a reference electrode in the potential determination. The lower limit of measuring range is 0.07 microg F(-)/cu m. For a fluorine content between 1 and 50 microg F(-)/cu m the standard deviation for the method is about 3.5%. The apparatus, the sampling and measuring procedure and calculation of results are described.

10586 APTIC NO. 27966

Kirschbaum, Ulrich, Rainer Klee, and Lore Steubing

LICHENS AS INDICATORS OF POLLUTION IMMISSION WITHIN THE CITY LIMITS OF FRANKFURT/M.

(Flechten als Indikatoren fuer die Immissionsbelastung im Stadtgebiet von Frankfurt/M). Text in German. Staub-Reinhalt. Luft, 31(1):21-24, Jan. 1971. 20 refs.

Lichens growing naturally on trees within the city limits of Frankfurt have been plotted on a map and the degree of air pollution has been tested by means of explantates of Parmelia physodes placed at different sites in the city where they were exposed to the atmosphere. The mortality rate of the explantates was correlated with the level of pollution and classified by means of an 8 digit scale. Lichens react sensitively to sulfur dioxide, to unfavorable conditions of humidity and to dust. In 1865 over 300 lichen species were identified in the area, today the number of species is far lower. The map shows a complete absence of lichens in the center of the city, generally in an area with a median concentration of 0.11 mg/SO2/cu m and a median monthly dust fall of 50 g/sq m. In contrast, trees in three parks manifested 23, 29 and 40% higher lichen growth than trees in the respective adjacent inhabited area. The map shows several zones characterized by lichen growth of differing vitality corresponding to the pollution level. Temperature differences do not affect the growth of lichens.

10587 APTIC NO. 27996

Hongo, Syozo, Tsutomu Ohta, Masashi Suzuki, and Yoshiro Yanagi

SIMPLIFIED METHOD FOR MEASURING PARTICLE SIZE DISTRIBUTION BY USING CASCADE IMPACTOR.

(Kasukedo inpakuta niyoru kani ryudo bunpu sokuteiho). Text in Japanese. Funtai Kogaku Kenkyukai-shi J. Res. Assoc. Powder Technol., Japan), 8(1):3-7, Feb. 1971. 5 refs.

To establish a practical method for measuring the aerodynamic size distribution of aerosol samples collected by a 4-stage cascade impactor, a theoretical calculation was made. The theory of Ranz and Wong was taken as a basis, and the size distribution of collected particles was calculated, by the use of a computer, fo 345 kinds of particle size distributions having 23 times 15 parameters. A log-normal size distribution was assumed for the aerosol samples. To simplify the calculation and also to make the calculation applicable to any type of cascade impactors, the partial collection efficiency of each stage of the cascade impactor was approximated by a formula of general form. The result of the calculation is presented in terms of the proportion of particles collected on each stage and designated a ready-reckoner. In practice, by measuring the number of particles, mass, and activity, of the aerosol collected on each stage of a cascade impactor, a best fit is obtained among the 345 kinds of size distribution, calculated in advance by computer. From this, the geometrical mean diameter and standard deviation of the given sample of aerosol are obtained. The procedure is facilitated by the use of the ready-reckoner. Since the actual size distribution of most aerosols is known to be log-normal, the present method is considered to be accurate enough to yield a good approximation for the particle size distribution.

10588 APTIC NO. 27998

Cropper, Wendell and Sixt Frederick Kapff

SULFUR DETECTING METHOD AND APPARATUS.

(Standard Oil Co. of Indiana, Chicago, Ill.) U. S. Pat. 3,547,590. 4p., Dec. 15, 1970. 4 refs. (Appl. Dec. 26, 1967, 9 claims).

The apparatus and method described permit the accurate, continuous detection and measurement of the sulfur content of hydrocarbon feed streams, particularly the distillate fuel streams from desulfurizers. The equipment and method eliminate the long time lag that formerly existed when laboratory methods of testing were employed. The method includes introducing a sample into the combustion zone of a furnace, effectuating complete combustion, separating system-interfering materials, (carbon dioxide and sulfur dioxide) from the combustion product, transferring the material to be tested to a water stream, and measuring the material contained in the water. Complete combustion is achieved by a furnace temperature controller, while carbon dioxide is eluted in a gas chromatographic column. Subsequently, sulfur dioxide is dissolved into a stream of water in a diffuser cell and the stream of water passed to a conductivity cell, which provides an output signal calibrated to correspond to the sulfur concentration in the stream. The instrument will measure sulfur levels as low as 0.01 and as high as 15% or more. The time required for analysis is about three min.

10589 APTIC NO. 28012

Kay, R. B.

ABSORPTION SPECTRA APPARATUS USING OPTICAL CORRELATION FOR THE DETECTION OF TRACE AMOUNTS OF SO2.

Appl. Opt., 6(4):776-778, April 1967. 4 refs.

Sulfur dioxide is a molecule active in the middle ultraviolet and displaying photodissociation absorption spectra characterized by regularly spaced maxima and minima. An optical correlation technique is described that is sensitive to several of these regular spacings. A mask composed of a series of transmission slits which correlate with the SO2 absorption minima between 2900 and 3100 A can be placed at the exit plane of a spectrometer. The mask is then moved harmonically at 20 Hz by a hysteresis synchronous motor. If SO2 absorption bands are present in light analyzed by the spectrometer, an alternating signal will be developed by the motion of the mask and detected by a photomultiplier placed immediately behind the mask. The apparatus was designed for field measurement of small concentrations of SO2 as an air pollutant. Typical wavelength scans obtained in a field test are reproduced.

10590 APTIC NO. 28017

Webster, S. H.

CHEMICAL METHODS OF LEAD ANALYSIS.

Public Health Bulletin, no. 262:111-122, 1941.

Chemical analyses were carried out for the determination of the lea content of varied types of samples. Some 300 samples of air containing lead dust and fumes were obtained in the field as were a number of samples of drinking water. In addition, about 800 specimens of urine and a similar number of single blood specimens were obtained. In general, the evaluation necessitated the following procedures: (l) sampling and collection of samples; (2) ashing and concentration; and (3) isolation and determination of the lead content. The last step was carried out using the volumetric chromate method for most impinger samples and the two color diphenylthiocarbazone (dithizone) method for the control of urine and blood specimens. Each step is described in detail and the accuracy of the analytical values is assessed.

10591 **APTIC NO. 28058**

PORTABLE INFRARED GAS ANALYZER FOR THE MEASUREMENT OF CONCENTRATIONS OF HETEROGENOUS GASES.

(Transportables Infrarot Gasanalysengeraet zum Messen der Konzentration verschiedenatomiger Gase). Text in German. Technica, 20(1):22, Jan. 1971.

The Ultramat A, which is a portable infrared gas analyzer, permits high accuracy x

10592 **APTIC NO. 28070**

Vol'fson, V. Ya. and A. F. Sudak

CHROMATOGRAPHIC DETERMINATION OF CARBON DISULFIDE, CARBON DIOXIDE, AND SULFUR DIOXIDE MICROCONTAMINANTS IN AIR (EXCHANGE OF EXPERIENCE).

Ind. Lab. (USSR) (English translation from Russian of Zavodsk. Lab.), 36(9):1322-1323, Sept. 1970. 6 refs.

Trace concentrations of carbon dioxide, carbon disulfide, and sulfu dioxide in air were quantitatively determined by chromatography wit a thermal conductivity detector silanized. Chromosorb G, cooled in a hydrogen current and impregnated with sebacic acid dinitrile, was used as a support. In the column, the sorbent was previously treated with a mixture of SO2 in air for 2-3 hr at 35 C. Separation was carried out at 35 C, with a hydrogen gas carrier flow rate of 80 ml/min, and a bridge current of 180 mA. The sample was enriched by first freezing the components of the mixture (-183 deg) in a concentrator. The minimum determinable amounts of substances by this method are as follows: CO2, 0.0001; CS2, 0.0005; and SO2, 3 times 10 cu cm.

10593 **APTIC NO. 28102**

Eguchi, T.

ELECTROCHEMICAL ANALYSIS METER.

(Denki kagakushiki bunseki kei). Text in Japanese. Denshi Kagaku (Electron. Sci.), 21(2):61-70, Feb. 1971. 6 refs.

Several electrochemical devices for measuring environmental pollutants are described. One instrument incorporates the principl of electrolytic conductivity to measure atmospheric sulfur dioxide concentrations. Air sampled at a controlled constant speed is passed through a filter to an adsorption tube into which dilute hydrogen peroxide is continuously introduced. When present in the sampled air, SO2 reacts to form sulfuric acid, concentrations of which increase in proportion to the amount of SO2 present. Since the sulfuric acid changes the electrolytic conductivity of the solution, changes in conductivity before and after contact indicate the SO2 concentration of the sampled air. A new method for measuring electric current uses coulometric analysis to obtain a concentration of a sample by consumed electric charge when a titration reagent reacts on the sample for equivalence. This method is employed for measuring both SO2 and oxidants. A galvanic coulometric method and a polarization current method are also used to measure oxidant concentration. An ion selection electrode is used to measure fluoride and hydrogen cyanide. In combination with a calomel reference electrode, this electrode picks up the concentration of a specific ion in solution as the potential difference. Another device utilizes a fuel cell to measure nitrogen oxide and SO2 concentrations.

10594 **APTIC NO. 28116**

Agneray, Louis, Arlette Clayer, and Maurice Bruni

METHOD OF CONTINUOUS SEPARATION BY COUNTERCURRENT ABSORPTION IN GASEOUS PHASE.

(Societe de Recherches Techniques et Industrielles, Boulogne (France) U. S. Pat. 3,553,937. 8p., Jan. 12, 1971. 2 refs. (Appl. Jan. 26, 1968, 7 claims).

A method is described for the continuous separation of a gaseous mixture into its various constituents by countercurrent absorption into a liquid with which a solid support is impregnated. The impregnated solid is circulated within a chromatographic separating column countercurrent to the gaseous mixture to be analyzed. The gaseous mixture to be analyzed is introduced at an intermediate point of the column, and the impregnated solid is passed successively through a depletion zone, an enrichment zone, a desorption zone, and a purge zone. Desorption of the most strongly absorbed constituents is carried out in the desorption zone by heating and completed in the purge zone by elution with a fraction of the constituents which are the least strongly absorbed. The fraction of the most strongly absorbed constituents which has been desorbed in the purge zone and the fraction of the least strongly absorbed constituents which has served to desorb the most strongly absorbed constituents in the purge zone are recycled to the inlet. The most strongly absorbed constituents are drawn-off at the top of the absorption zone and th least strongly absorbed constituents are drawn-off at the top of the depletion zone. (Author abstract modified)

10595 **APTIC NO. 28125**

Kostyukovsky, Ya. L.

AN EXPRESS METHOD FOR DETERMINING VAPORS OF HALOGEN ANHYDRIDES OF ORGANIC ACIDS IN AIR.

(Ekspress-metod opredeleniya parov galoidangidridov organicheskikh kislot v vozdukhe). Text in Russian. Zh. Analit. Khim. (Moscow), 15(11):2228-2230, 1970. 9 refs.

Para-dimethylaminobenzaldehyde is condensed with dialkyl aniline in the presence of halides of organic acids to form triarylmethane dyes on a sorbent surface. This procedure lends itself to rapid qualitative and quantitative detection of organic acid halides in air. Photometric determination of dye intensity yields 10% accuracy.

10596 **APTIC NO. 28129**

Cralley, Lewis J.

IDENTIFICATION AND CONTROL OF ASBESTOS EXPOSURES.

Am. Ind. Hyg. Assoc. J., 32(2):82-85, Feb. 1971. 12 refs.

To distinguish between asbestos and other fibers, new techniques must be applied to electron microscopy and diffraction, emission and atomic absorption spectrophotometry, electron microprobe, and neutron activation analytical procedures. Standards and evaluation techniques should be based on airborne fibers and the use of the membrane filter and phase contrast microscopy for sampling and counting. Controls should include procedures for the safe transport of asbestos, exhaust ventilation and personal protection at work sites, the safe transport of waste dusts, and the prevention of community contamination. (Author abstract)

10597 APTIC NO. 28141

Stephens, Edgar R.

IDENTIFICATION OF ODORS FROM CATTLE FEED LOTS.

Calif. Agr., 25(1):10-11, Jan. 1971. 2 refs.

To identify the odorant compounds from typical cattle feedlot operations and to develop suitable chemical analytical methods for their determination and measurement, a small-scale project was conducted at the State-wide Air Pollution Research Center of th University of California. Several classes of compounds which were obvious candidates for analysis included the amines, sulfur compounds, and low molecular weight organic acids. Trimethylamine, especially, is a powerful odorant very reminiscent of feedlot areas. Gas chromatography with both flame ionization and electron capture detectors was the first method of analysis chosen for odorous materials. Paper chromatography was also investigated, as were various spectrometric techniques and flame photometry. The low molecular amines were suggested to be the most important odorous compounds in feedlot air. Odor threshold values of some strong odorants are presented tabularly.

10598 APTIC NO. 28145

Sekigawa, Yukio and Masachi Nashiko

CONTROL SYSTEM.

(Kontororu sisutemu). Text in Japanese. Denshi Kagaku (Electronic Sci.), 21(2):35-40, Feb. 1971.

So that air pollution control authorities can identify sources of air pollution and take appropriate action when concentrations are high, air monitoring networks are installing telemetering systems and data processing equipment. Data from field monitoring stations are relayed to a central monitoring station at 10, 15, 30, or 60 mi intervals. The data concern not only measurements of specific pollutants but also meteorological factors such as wind direction and velocity, temperature, humidity, and others. When data processing at the central station indicates that pollution is or will be excessive, alerts are issued simultaneously to pollution sources and to the public. A simultaneous communication system provides the central office with confirmation that the alert has been received by a plant or industry. The monitoring system, which requires some improvements such as the standardization of measurement gauges, will be used for water pollution in the near future.

10599 APTIC NO. 28156

Kanagawa, Akira

THE LATEST METHODS FOR MEASURING THE SIZE OF AEROSOL PARTICLES - LIGHT SCATTERING PARTICLE COUNTER.

(Saikin no biryushi sokutei - kosanran ryushi kaunta ni tsuite). Text in Japanese. Sango Kankyo Kogaku (Ind. Environ. Eng.), no. 67:79-87, 1969. 14 refs.

Methods for measuring the size of aerosol particles can be classified into three groups: direct measurement with a microscope; measurement of the sedimentation speed in gravitational, centrifugal, or electrostatic fields; measurement of light scattering by aerosol particles. The last method uses either photometric methods or photocounting techniques. In the photometric method, the intensity of light scattered by a multitude of particles, the scattered light's directional distribution of polarizing ratio, or the spectral distribution of the transmitted light's intensity are measured and the particle size distribution is computed theoretically. In the photocounting method, the intensity of light scattered by individual aerosol particles is measured and the intensity correlation with particle size distribution. In the photocounting method, pulse height and the pulse frequency measured by a counter are directly compared to particle size distribution and particulate density. The photocounting method is rapid, simple, relatively free from human errors, and gives a large number of measured values continuously and automatically. Of the current methods, it is the most suitable for measuring the size of aerosol particles. However, photocounting presents problems in the smallest measurable particle size, the proportionality of pulse height to particle size, and the effect of particle refractive index. The relation between pulse height, particle size, and particle refractive index is obtained theoretically, and the sensitivity, the proportionality and the material dependency are discussed.

10600 APTIC NO. 28165

Kamiyama, Hiroaki

RELIABILITY OF THE METHODS FOR MEASURING SULFUR DIOXIDE IN THE ATMOSPHERE.

(Taiki chuno nisanka iou sokuteiho ni kansuru shinraisei nitsuite). Text in Japanese. Bunseki Kagaku (Japan Analyst) (Tokyo), 19(11):1601, Nov. 1970.

The disagreement between sulfur dioxide values obtained with an air pollution (AP) meter and the rosalinine method was studied. A high-recision, large-scale standard gas generator and a condenser-collector of polluted air were designed and built for a microanalysis of pollutant components. The gas generator prepared SO2 concentrations of 0.05-0.20 ppm with an accuracy of 95%, or within the plus or minus 0.02 ppm confidence range. The sulfite standard rosalinine method gave an SO2 value 10% lower than the AP meter. Nitrogen oxides up to 0.2 ppm, carbon monoxide up to 40 ppm, and hydrochloric acid up to 0.2 ppm did not affect the AP reading. No differences in AP values due to location were observed in field tests, nor did the effect of atmospheric salt depend on locality. The effect of salt on AP meter readings was about 0.01 ppm. No other components of air affected meter values except ammonia, which lowered the value. It is concluded that the higher SO2 value measured with the AP meter is due to the loss of the absorbent in the meter.

10601 APTIC NO. 28167

Nagami, Yasuji

ACTUAL APPLICATIONS OF VARIOUS POWDER DUST MEASURING METHODS.

(Funjin keisokuho no jissai ni tsuite). Text in Japanese. Preprint, Society of Electro-Chemistry, Tokyo (Japan), Kanto Div., 18p. 1971. (Presented at the Seminar on Air Pollution, Tokyo, Japan, Feb. 3-4, 1971, Paper 2.)

Various dust measurement methods, general procedures and apparatus, as well as the calculation formulas involved are presented. Although primarily devoted to the measurement of smoke particles in a stack, the measurement of smoke particles in the atmosphere is also considered. Proper selection of the measuring point in the stack is mentioned, including the proper instruments, preliminary measurements, tube and filter paper methods of sample collection, and estimation formulas. Use of the Ringelmann chart is introduced, and photometric smoke density apparatus is briefly touched upon. Precipitating dust particles may be measured by a deposit gauge technique, Petri's dish method, or with the aid of a dust jar, while suspended particles may involve the use of the high-volume air sampler, an electric dus collector, or impinger methods. The relative density of dust may be determined by a tape air sampler, the Roken system impactor, or a digital dust indicator.

10602 APTIC NO. 28198

Tartler, G. and P.-M. Theus

STANDARDIZATION OF GERM COUNTING AND OF AIR DEGERMINATION PROCEDURES.

(Zu Fragen der Standardisierung von Keimzell- und Luftentkeimungs- verfahren). Text in German. Arch. Exp. Veterinaermed., vol. 21:367-376, 1967. 32 refs. 28202 Purdue, Larry J., Jared E. Dudley, John B. Clements, and Richard J. Thompson STUDIES OF AIR SAMPLING FOR NITROGEN DIOXIDE. I. A REINVESTIGATIO OF THE JACOBS-HOCHHEISER PROCEDURE. Preprint, National Air Pollution Control Administration, Research Triangle Park, N. C., Div. of Air Quality and Emission Data, 18p., Sept. 21, 1970. 10 refs.

The National Air Sampling Network uses aqueous sodium hydroxide (Jacobs-Hochheiser procedure) as the absorbing reagent for collecting nitrogen dioxide from ambient-air. This supposedly produces nitrite and nitrate ions and chemical analysis of the nitrite is used as a measure of the nitrogen dioxide in the air sample. Stoichiometric factors are included in the calculations to account for the nitrate not measured, but there are a number of problems associated with this method. The advent of permeation tubes as a means to generate accurately known levels of nitrogen dioxide in air permitted a systematic investigation from a perspective not previously available. Artificially prepared samples of pure air containing 0.044, 0.082, 0.109, and 0.204 ppm nitrogen dioxide were prepared and sampled with 0.25 N sodium hydroxide absorber. The exposed reagent was then analyzed for nitrite ion using a diazotizing-coupling procedure. Nitrite plus nitrate was also measured by first reducing the nitrate to nitrite then analyzing for nitrite as above. Comparison of the total, nitrite plus nitrate, with the nitrite alone, conclusively showed that no nitrate ion was generated in the sampling procedure and that measurement of nitrite alone in the exposed reagent is sufficient for analysis. The average overall efficiency of absorption of nitrogen dioxide in the alkaline reagent is 35%. Reevaluation of the dispersers showed that fritted glass bubblers give higher precision than glass-restricted orifices. (Author abstract)

10603 APTIC NO. 28203

Bando, Shoji, Yukio Murakami, and Yasuhiro Yamane

A METHOD FOR THE DETERMINATION OF VARIOUS METALS IN DUST AND PRECIPITATION COLLECTED IN AIR-POLLUTED AREA BY RADIOACTIVATION ANALYSIS.

Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 23p., 1970. (Presented at the Air Pollution Control Association, Annual Meeting, 63rd, St. Louis, Mo., June 14-18, 1970, Paper 70-63.)

Dust fall was collected with a deposit gauge and suspended particulate matter was collected with an air sampler in the Keiyo industrial area once a month. Samples were subjected to radioactivation analysis using thermal neutron irradiation. The determination was made on aluminum, manganese, and vanadium as the short-lived nuclides and on scandium, chromium, iron, cobalt, zinc, and antimony as the long-lived nuclides. These metals were selected with consideration to the position of the photoelectric peak formed. In the determination, a part of the sample after irradiation was submitted to anion exchange in order to compare the results with the non-destructive method. The correction and secondary reaction of zinc was also examined which might interfere in the determination of scandium. This method of analysis is accurate and requires a short period of time. During the separation, the corresponding tracers were used to obtain the radiochemical yield of these elements, enabling a decrease in sample size and also allowing the determination of many samples simultaneously with high sensitivity, suggesting high applicability.

10604 APTIC NO. 28207

Bishop, D. M.

INSTRUMENTS.

In: Gas Purification Processes. G. Nonhebel (ed.), London, George Newnes, Ltd., 1964, Chapt. 3, p. 43-76. 26 refs.

A summary is presented of the most important factors governing the choice of instruments for measurements of temperature, pressure and pressure difference, liquid level, flow rate and total flow, and gas composition. The latter is discussed at length under the headings of thermal conductivity, paramagnetism, gas chromatography mass spectrometry, absorption of electromagnetic radiation, chemica reaction, dew-point measurement, and pH measurement. Sampling and calibration are noted to be the major problems in analytical instrumentation. Automatic control of instruments is briefly discussed, with emphasis being placed, as in sections dealing with measurements, on application of currently available devices.

10605 APTIC NO. 28208

Gol'dman, E. I.

REGARDING METHODS OF DETECTING NITROGEN OXIDES IN ATMOSPHERIC AIR.

(K voprosu o metodakh opredeleniya okislov azota v atmosfernom vozdukhe). Text in Russian. Gigiena i Sanit., 26(2):53-54, 1961. 2 refs.

A method for total determination of nitrogen oxides in atmospheric air is described in which the air sample is treated with an oxidizing mixture, neutralized with a 0.1N alkali solution, and evaporated to dryness. The resultant residue is treated with phenolsulfonic reagent and neutralized with ammonia to produce a solution containing ammonium picrate. This solution is measured colorimetrically and the results are converted to equivalent N2O5 concentrations.

10606 APTIC NO. 28214

Hemeon, Wesley C. L. and George F. Haines, Jr.

AUTOMATIC SAMPLING AND DETERMINATION OF MICRO-QUANTITIES OF MERCURY VAPOR.

Am. Ind. Hyg. Assoc. J., vol. 22:75-79, Feb. 1961. 1 ref.

A new technique for the automatic sampling and determination of mercury vapors is based on supplying the AISI smoke sampler with Whatman No. 4 filter paper impregnated with a solution of iodine in potassium iodide. The mercury trapped by the treated filter paper is then volatilized in a procedure that releases mercury as a vapor into a stream of air which passes through a sensitive to mercury vapor concentration as low as 0.005 ppm. This method would have value in an industrial hygiene situation where automatic sampling at several locations is desirable for evaluating a mercury hazard. Details of the procedure and calibration are given.

10607 APTIC NO. 28236

O'Neil, R. L.

SPECTROCHEMICAL DETERMINATION OF BERYLLIUM IN AIR-BORNE DUST AT THE MICROGRAM AND SUBMICROGRAM LEVELS.

Anal. Chem., 34(7):781-784, June 1962. 19 refs. (Presented at the Conference on Analytical Chemistry and Applied Spectroscopy, Pittsburgh, Pa., March 1962.)

A spectrographic procedure for determining beryllium in air-borne dust is described. In-plant sampling is done with a portable high volume sampler and Whatman filters. Samples are burned with the direct current arc in a controlled atmosphere of carbon dioxide gas, with a mixture of lutelium oxide in calcium carbonate used as internal standard. Precision in the 2-50 microgram range is from plus or minus 4 microgram at the 95% confidence level. The method is sensitive to 0.000001% by weight of beryllium or 0.0001 microgram of beryllium in the electrode. (Author abstract modified

10608 APTIC NO. 28237

Sill, Claude W. and Conrad P. Willis

FLUOROMETRIC DETERMINATION OF SUBMICROGRAM QUANTITIES OF BERYLLIUM. Anal. Chem., 31(4):598-608, April 1959. 15 refs.

Although 2',4',3,4,5,7-pentahydroxyflavone (morin) is the most sensitive reagent known for the determination of beryllium, available procedures are not particularly reliable at extremely low levels. A fluorometric method using morin has been developed that has a detection limit of 0.0004 gamma and a precision to 0.8% on 0.2 gamma at the 95% confidence level. Reliability and precision are improved greatly through use of a buffer system, an internal acid-base indicator, a permanent glass standard of fluorescence, and complexing agents. Detailed methods of separation of beryllium and application to air-dust and smear samples, urine, bone, ores, and steel are given. They were checked at each step using beryllium 7 tracer. Errors produced by certain metals and by variations in the procedure are described. (Author abstract modified)

10609 APTIC NO. 28238

DETECTION OF TOXIC DUST CONCENTRATIONS: INSTANTANEOUS MONITORING OF FACTORY ATMOSPHERES.

Engineering (London), 179(4673):89, Jan. 21, 1955.

A mobile, direct-recording spectrographic monitor for beryllium in industrial atmospheres is described. Air to be sampled is drawn into the instrument between two copper electrodes and the light emitted by a spark discharge is focused on the slit of a Littrow type monochromator having a multiplier photocell behind its exit slit; the photomultiplier signal operates a circular chart recorder through a direct-current amplifier. Although the indication is only semi-quantitative, calibration comparisons show that monitor figures are within a factor of 2 at the beryllium tolerance figure (2 micrograms/cu m). At higher levels the accuracy increases rapidly. The instrument responds to beryllium in the form of the oxide, of the fluoride and ammonium double fluoride, and as beryl ore.

10610 APTIC NO. 28239

Cabrera, A. M. and T. S. West

A NEW SPECTROPHOTOMETRIC REACTION OF BERYLLIUM.

Anal. Chem., 35(3):311-313, March 1963. 9 refs.

A highly sensitive method is described for the spectrophotometric determination of beryllium in concentrations from 0.01 to 7 ppm. The color reaction between the reagent Fast Sulphon Black F and beryllium is specific at pH 11 to 11.2 in the presence of disodium (ethylenedinitrilo) tetraacetate dihydrate (EDTA) and potassium cyanide (KCN) among some 25 cations examined. Fluoride, citrate, tartrate, etc. do not interfere and a 10-fold amount of phosphate can be tolerated. The only cations which tend to interfere ware chromium (III) and tin (III), and these can be rendered harmless by previous oxidation to their higher valency forms. The stability, sensitivity, and freedom from interference of the proposed method compare favorably with those of the standard methods now in use. (Author abstract modified)

10611 APTIC NO. 28240

Wheeler, G. V., W. A. Ryder, and K. R. Arnold

ANALYSIS OF AIR SAMPLES FOR BERYLLIUM BY THE ROTATING PLATFORM SPECTROGRAPHIC TECHNIQUE.

Appl. Spectry., 16(1):17-19, 1962. 17 refs.

Beryllium is determined spectrographically on air sample filter papers by direct sparking of the filter paper mounted on a silver disk which revolves on a rotating platform electrode apparatus eccentric from a silver counter electrode. The procedure is fast and precise, with a minimum of sample handling and can be used with samples containing as little as one millimicrogram of beryllium. (Author abstract)

10612 APTIC NO. 28244

MacDowall, Joseph

THE DEVELOPMENT AND TESTS OF AN AIRBORNE CORRELATION SPECTROMETER FOR AIR POLLUTION SURVEY.

Preprint, American Inst. of Aeronautics and Astronautics, New York, 13p., 1969. 5 refs. (Presented at the Anglo-American Aeronautic Conference, 11th, London (England), Sept. 8-12, 1969, Paper 7.)

A correlation spectrometer was developed for aircraft measurements of atmospheric sulfur dioxide or nitrogen dioxide. The device measures the amount of SO2 or NO2 by the spectral analysis of diffusively back-reflected sun and sky visible and ultraviolet light. Tests of the method were conducted to Washington, D. C., Los Angeles, and Tennessee. In Washington, the method provided a rapid and direct measurement of the total city production of SO2 (16 k/s). A synoptic survey of Los Angeles Basic NO2 pollution showed the airborne average to be repeatable and to correlate well with ground measurements. An SO2 power-plant plume was traced for 30 km down the Tennessee-Sequatachie Valleys. The ability of the spectrometer to track air pollution plumes provides a tool for a rapid synoptic survey when pollution incidents threaten, a means of rationally selecting ground-level monitoring sites, and a method of detecting and locating pollution sources and observing their strength variations.

10613 APTIC NO. 28252

Dodd, A. E. and G. Garratt

THE MEASUREMENT OF DIESEL EXHAUST SMOKE--THE U.T.A.C. SMOKEMETER.

Motor Industry Research Association, Nuneaton (England), Rept. 1968/8, 19p., May 1968. 3 refs.

The U.T.A.C. (Union Technique de l'Automobile, du Motocycle et du Cycle) smokemeter is a full-flow, light-obscuration instrument designed to measure diesel exhaust smoke in units equivalent to Hartridge smoke units. The smokemeter was developed primarily for carrying out 'free-acceleration' tests in accordance with French legislative requirements, but it can also be used for steady-speed and slow-acceleration tests. For correlation purposes the U.T.A.C. smokemeter was compared with the Hartridge smokemeter since the latter is of the same type and is widely used in Europe. Simultaneous U.T.A.C. and Hartridge measurements were made on two engines mounted on test beds and on 10 vehicles on a chassis dynamometer. Under steady-speed and controlled- acceleration conditions, a reasonable correlation was obtained between the two instruments. Under free-acceleration conditions, the correlations between the smokemeters were markedly different for different engines. In particular, the U.T.A.C. gave substantially lower readings for engines emitting blue (lubricating oil) smoke. The reduced response appears to linked with the design of the U.T.A.C. optical system. In use, the U.T.A.C. device was inconvenient, bulky, and also dirty. Adjustment to the 'zero set' was difficult and zero drift was a problem.

10614 APTIC NO. 28255

Goldstein, Gerald

DETERMINATION OF BERYLLIUM BY THE PHOTONEUTRON METHOD.

Anal. Chem. 35(11):1620-1623, Oct. 1963. 20 refs. (Presented at the Oak Ridge Radioisotope Conference, Gatlinburg, Tenn., April 1-3, 1963.)

A portable instrument is described which provides adequate sensitivity with minimum radiation hazard for the photoneutron analyses of beryllium in solid or liquid samples. Because large B(10)F3 neutron counter tubes (2-in.) are used, the neutron detection efficiency of the instrument is sufficiently great so tha a gamma source activity of only approximately 300 mc of Sb(124) is necessary for most samples. With this source activity, sample solutions containing as little as 60 microgram Be/ml, or 1.5 microgram total beryllium, can be analyzed with a relative standard deviation of plus or minus 1%. Interference caused by elements which absorb neutrons is eliminated by the cadmium shield technique. Results are shown for the determination of beryllium in several types of samples. (Author abstract modified)

10615 APTIC NO. 28257

Liberti, A. and V. Cantuti

DETERMINATION OF POLYCYCLIC HYDROCARBONS IN URBAN ATMOSPHERIC DUST BY MEANS OF GAS CHROMATOGRAPHY.

(Determinazione degli idrocarburi policiclici nel pulviscolo urbano mediante cromatografia in fase gassosa). Text in Italian. Nuovi Ann. Igiene Microbiol. (Rome), 15(6):502-510, Nov.-Dec. 1964. 13 refs.

Gas chromatography has been applied to the determination of hydrocarbons extracted from urban atmospheric dust in places where pollution is mainly due to motor engine traffic and to heating sources. By employing a high-efficiency glass capillary column and by operating at a programmed temperature, the concentration of various polycyclic hydrocarbons can be measured simply and rapidly. The distribution of various pollutants and their concentration were followed over a period of time. (Author summary modified)

10616 APTIC NO. 28279

Kirkbright, Gordon F., T. S. West, and Colin Woodward

SPECTROFLUOROMETRIC DETERMINATION OF SUBMICROGRAM AMOUNTS OF ALUMINUM AND BERYLLIUM WITH 2-HYDROXY-3-NAPHTHOIC ACID.

Anal. Chem., 37(1):137-143, Jan. 1965. 19 refs.

Measurement of the fluorescence intensity at 450 millimicron of the blue fluorescent aluminum and beryllium complexes of 2-hydroxy-3- naphthoic acid provides a rapid method for determining aluminum and beryllium down to the 2 and 0.2 ppb levels, respectively. The optimum conditions of pH, reagent concentration, and development time are established, and a study of the effect of a large number of cations and anions is presented. Aluminum and other metal ions can be prevented from interfering in the beryllium determination by masking with the calcium complex of trans 1,2-diaminocyclohexan tetraacetic acid (CDTA). Continuous variations, mole-ratio, and slope-ratio studies indicate the formation of a 1-to-1 complex between the reagent and aluminum or beryllium. The conditional stability constants for the complexes are evaluated. (Author abstract modified)

10617 APTIC NO. 28285

Pack, M. R., A. C. Hill, M. D. Thomas, and L. G. Transtrum

DETERMINATION OF GASEOUS AND PARTICULATE INORGANIC FLUORIDES IN THE ATMOSPHERE.

(American Society for Testing and Materials, Philadelphia, Pa., Am. Soc. Testing Mater. Spec. Tech. Publ. no. 281:27-44, 1959. 25 refs.

Problems encountered in sampling and analyzing low concentrations of atmospheric fluorides are reviewed, and techniques are described that gave good results in extensive sampling programs. A Greenburg-Smith type impinger efficient collection of both gaseous and particulate fluorides, except possibly submicron particles. Good separation of gaseous and particulate fluorides was achieved by drawing the air sample through aluminum tubes or sodium bicarbonate-coated glass tubes. The gaseous fluorides were adsorbed on tube surface and the aerosol passed on into a subsequent impinger. Molecular membrane filters were also efficient for separating the different forms of fluoride, if properly used. Filter paper and an electrostatic precipitator gave poor separation because they picked up appreciable amounts of hydrogen fluoride along with the particulate fluoride. Hydrogen fluoride was absorbed as efficiently in water as in alkaline solution. Air samples containing only a few micrograms of fluoride can be accurately analyzed by isolating the fluoride by distillation or by use of anion exchange resins followed by titration or spectrophotometric analysis. For determining certain insoluble fluorides, distillation and titration are probably preferable. The choice of methods will depend on the concentrations of fluorides present, the objectives of sampling, equipment available, and the particular abilities of the personnel involved. (Author summary modified)

10618 APTIC NO. 28288

Bassett, Emery, Henry Frankel, and Raymond Grenley

ENVIRONMENTAL SIMULATION CHAMBERS: DESIGN AND MONITORING OF MULTIPLE AND VARYING POLLUTANT CONCENTRATION.

Preprint, American Chemical Society, Washington, D. C., p. 55-59, 1970. 1 ref. (Presented at the American Chemical Society, 159th National Meeting, Div. of Water, Air, and Waste Chemistry, Houston, Tex., Feb. 25, 1970.)

A system is described for simulating an environment in which it is necessary to test for a large number of pollutants under varying conditions of temperature, humidity, and sunlight. Commercial stainless steel chambers fill many requirements, or, for corrosive gases, an all-glass pressure vessel with teflon fittings may be used. Concentration of pollutants in the chamber can be varied over ten orders of magnitude in the ppm or ppb level; to achieve the proper dilution, a modular approach to a dosing system may be used, employing permeation tubes and a dynamic serial dilution device as basic elements. To simulate auto exhaust, a reactor design is used which permits simultaneous changing of concentrations of nitrogen oxides, hydrocarbons, carbon monoxide, and carbon dioxide without resorting to an actual engine and dynamometer. A gas chromatograph with specific design features for trace gas analysis is described; the basic instrument is supplemented by an ultrasonic detector, a flame photometric detector for sulfur pollutants, and an electron capture detector for halogen and nitrate compounds. With either of two methods used for handling gas samples, programmed unattended operation is possible. Data handling techniques are outlined; the system can also monitor flow rates, temperature, pressures, and humidity for later analysis.

10619 APTIC NO. 28291

Oura, Masahiro and Motoo Komagata

NON-DISPERSIVE INFRARED ANALYZER.

(Hibunsankei sekigaisen bunseki kei). Text in Japanese. Denshi Kagaku (Electronic Sci.), 21(2):23-27, Feb. 1971. 5 refs.

The non-dispersive infrared analyzer was developed for industrial applications but has recently been widely used in the quantitative analysis of automobile exhaust fumes and industrial waste gases. It utilizes measurement of the molecular dipole moment to determine the amount of infrared energy absorbed by a gas sample. The use of such physical phenomena provides rapid response, high selectivity, and simple maintenance. Applications of the NDIR analyzer include the determination of carbon monoxide and carbon dioxide in air; carbon monoxide, nigrogen oxides, and hydrocarbons in automobile exhaust gases; and sulfur dioxide in stack gases. By comparison to the NDIR, a dispersive-type infrared analyzer has a complicated optical system and is not effective for long-term analysis. Two basic forms of the NDIR are the negative filter type and positive filter type. The former has a nonselectiv detector while the latter is selective with respect to specific wave lengths for specific sample gases. Brief discussion is provided concerning the condenser microphone used as a detector for in the positive filter NDIR. The noise elimination characteristics of the two common amplifiers used are compared. Response time of detectors are insignificant in contrast to the response time of indicator devices. The linearity of output and the automatic calibration circuitry are also discussed.

10620 APTIC NO. 28296

Konosu, Hisao, Masato Sato, Ayu Nakajima, and Yoshihisa Omori

TRIAL CONSTRUCTION OF A NON-DISPERSIVE TYPE VACUUM ULTRAVIOLET PHOTOMETER AND ITS APPLICATION TO GAS ANALYSES.

(Hibunsangata shiku shigai kodokei no shisaku to gasu bunseki eno oyo). Text in Japanese. Preprint, Inst. for Disaster Prevention (Japan), 2p., 1971. (Presented at the Disaster Prevention, Chemistry Meeting, 11th, Japan, Jan. 22-23, 1971.)

Design and performance data are reported for a nondispersive photometer which permits the continuous quantitative determination of a sample gas. The instrument measures the absorption intensit of the sample gas in the vacuum ultraviolet range and compares it to that of the reference gas (nitrogen). The photometer has an evacuated optical system. The ultraviolet light from the light source (a deuterium discharge lamp) is cut off by the combination of a concave grating and exit slit, so only vacuum ultraviolet light (165-20 nm) passes through the gas cell. The transmitted light is made visible by a thin fluorescent film and then detected by a photomultplier. Performanc tests show that the photometer performs satisfactorily as a continuous analyzer and accurately determines inflammable components in volatile gases. Allowable concentrations or explosion limits of many gases can be detected by this device, which has applications for safety control or process control in manufacturing.

10621 APTIC NO. 28300

Kimura, Shigeyuki

DISPERSION TYPE INFRARED ANALYZER.

(Bunsankei sekigaisen bunsekikei). Text in Japanese. Denshi Kagaku (Electronic Sci.), 21(2):15-22, Feb. 1971.

A dispersive type infrared analyzer is discussed with reference to its photometric system, electronics for signal processing, and the introduction of infrared absorption spectrum. The signal processing system differs according to the time-scale of observed or analyzed phenomena: the analysis stationary or slowly proceeding phenomena is the subject of this paper. There are two essential types of monochromatic devices, and others are variations of them: monochrometer is an independent device dividing an infrared ray into its energy or wavelength, another is a detector with the ability to select rays. The analyzer operates to divide the infrared ray from the light source, by mirrors, into sample and reference ray bundles. After their absorption in corresponding cells, these are sent alternatively to the monochrometer and are detected. The differenc in light intensity at a certain wavelength causes an alternating current in the detector, the frequency of which is determined by the revolutional speed of 2 perforated mirror disk gating the absorbed rays. The alternating signals are emplified and rectified to be modulated for a servo-motor. The motor is connected to an optical attenuator controlled to give the same intensity as each ray. The change of optical attenuation is recorded to give the absorption. A gas analyzer usually has two light source and not mirrors. The gas generally expands with the absorption of an infrared ray, and the change of the gas volume is measured as the change of capacitance. The design of the pre-amplifier depends on the type of detector used. The pre-amplifier is essentially a noiseless amplifier giving low impedance. The amplification of the main amplifier is 40-80 dB, and the frequency band selected is that of the chopper of absorbed ray for cutting off noise. Several problems in the design of amplifiers and rectifiers are cited. Two analyzers with different monochromatic devices are compared in terms of signal processing.

10622 APTIC NO. 28301

Kida, Koji

ELECTRONICS OF ATOMIC ABSORPTIOMETRY.

(Genshi kyuko bunsekiho). Text in Japanese. Denshi Kagaku (Electronic Sci.), 21(2): 49-58, Feb. 1971.

An atomic absorptiometer is discussed in terms of its electronics design. Atomic absorptiometry is applied to elemental analysis, and the determination of atmospheric lead, manganese, vanadium, nickel, iron, copper, beryllium, and cadmium. High accuracy of micro-analysis is obtained with the method (less than 0.1 ppm, accuracy 0.1-1.0%). Non-electronic mechanisms are introduced before electronic components such as the light source, photometer detector, amplifier, indicator, and accompanying circuits. Photometric systems for an analyzer are divided into four types: monobundle of rays direct-current method; alternating current method; double bundle of rays alternating-current method; and two-channel method. The second, monobundle of rays alternating-current method is widely used. Two types of modulation are prepared for the method: alternating current lighting or section method. The sensitivity of the atomic absorptiometer depends largely on light source and burner. The light source is discussed with respect to type, modulation, and stabilizing source circuits. A cathode follower is a vacuum discharge tube with cathode of the same element or material containing the same element, as the sample. The two types of light modulation have their own features and are used accordingly. Commercial frequency is widely adopted as the modulating frequency. The stabilizing circuit utilizes vacuum tubes for high voltages and current stability (0.1-0.05%). The detector is discussed regarding its photomultiplier and its high-voltage electric source. Amplifiers of both direct current and alternating current designs are discussed as are detection circuits and LOG transmission circuits. As an indicator, a simple meter is used. However, several kinds of recorders are prepared for preserving of records. Digital meter are appropriate for this purpose. Accompanying circuits are developed for the auto-ignition mechanism of flame, photo-gas monitor, auto correction mechanism of the calibration curve, the auto-regulation of zero point and integrator.

10623 APTIC NO. 28302

Babich, Valentin Grigorievich, Alexander Kuzmich Kursky, Konstantin Petrovich Markov, Nikoali Vasilievich Ryabov, and Konstantin Nikolaevich Stas

INSTRUMENT FOR DETERMINING THE WEIGHT AND ACTIVE CONCENTRATION OF AEROSOLS.

(Assignee not given.) U. S. Pat. 3,558,884. 4p., Jan. 26, 1971. 5 refs. (Appl. Jan. 8, 1968, 3 claims).

An instrument is presented for determining the weight of dust and the amount of radioactivity per unit volume of gas being monitored. The weight of the dust precipitate collected on a filter is determined by the rate of absorption of the radiation of an externa alpha particle radioactive source, while the active concentration of the aerosol is determined by measuring the background radiation of the sample. A radioactive source and a radiation detector are disposed in a gas intake conduit, the radioactive source being placed upstream with reference to a filter element and furnished with a mechanism for bringing the source out of the conduit during aerosol sampling. The instrument is furnished with a collimator to reduce the influence of the background activity of the sample on the measurements of the dust concentration. Present devices suffer from a number of limitations such as a lengthy measurement time while waiting for the dust to accumulate on the filter element, elaborate design of the radiation detector and also of the radiation intensity recorder, failure to account for variations in the thickness of the filter element, and indiscriminate recording of dust particles irrespective of the particle size.

10624 APTIC NO. 28303

Freeman, William R. and Karl J. Bombaugh

DETERMINATION OF REACTIVE HYDROCARBONS IN AIR.

(Mine Safety Appliances Co., Inc., Pittsburgh, Pa.) U. S. Pat. 3,558,283. 3p., Jan. 26, 1971. 9 refs. (Appl. June 9, 1967, 6 claims).

A difficulty encountered with the use of catalytic systems, afterburners, and related devices is that the content of reactive hydrocarbon in the exhaust varies with operating conditions. A method is provided for the determination of reactive hydrocarbons in automobile exhaust gases, which is rapid, simple, and operable by personnel not having technical training. By subjecting a stream of the exhaust gases to combustion, then removing the reactive hydrocarbon from the stream and again subjecting it to combustion, the content of reactive hydrocarbons can be determined as a function of the difference in the heats of combustion before and after their removal. The reactive hydrocarbon removal is effected by passage of the gases through a body of acid resistant granular material impregnated with an anhydrous solution of sulfuric acid and an alkali metal dichromate. Although the substitution of natural gas or liquefied petroleum gas as automotive fuels would presumably solve the problem of photochemically reactive hydrocarbons, storing problems and explosion hazards would then be encountered. (Author abstract modified)

10625 APTIC NO. 28322

Dmitriev, M. T. and N. A. Kitrossky

PHYSICO-CHEMICAL METHODS OF INVESTIGATION IN THE HYGIENIC ASSESSMENT OF ATMOSPHERIC AIR.

(Fiziko-khimicheskiye metody issledovaniya v gigiyene atmosfernogo vozdukha). Text in Russian. Vestn. Akad. Med. Nauk SSSR, 25(12):39-47, 1970. 20 refs.

Physico-chemical techniques for detecting and measuring air pollution are reviewed and include mass spectrometry, gas chromatography, and fluorescence analysis. Average mass spectrometric concentrations for 27 constitutents of air samples taken from polar regions in winter and concentrations of 26 harmful substances found in automotive exhaust are tabulated. The importance of these techniques to the further understanding of photochemical smog formation is pointed out, and known chemical mechanisms are reviewed. Relationships between atmospheric ozone levels and meteorological conditions are also examined.

10626 APTIC NO. 28338

Krivan, V.

A RADIO-RELEASE TECHNIQUE FOR DETERMINING TRACES OF ELEMENTS.

Z. Anal. Chem., vol. 253:192-194, 1971. 9 refs.

Trace elements are determined by fixing a small amount of an insoluble compound on a small disc of filter paper or other suitable material. The exchangeable ions of the compound are labelled with a radioactive isotope and are then replaced with ions of the trace element to be determined in a solution. After the labelled ions are released from the carrier into the solution by shaking, the activity of the species released is measured and compared with one or a series of standards processed in the same way. When the technique was used to determine trace amounts of mercury in the presence of several other elements, radioactively labelled silver sulfide and filter paper discs were used. The results obtained are summarized and the advantages and limitations of the method are discussed. (Author abstract modified)

10627 APTIC NO. 28350

Isobe, Mitsuo

CONTACT CATALYTIC COMBUSTION METHOD.

(Sesshoku nensho ho). Text in Japanese. Denshi Kagaku (Electronic Sci), 21(2):29-34, Feb. 1971.

Air pollution substances measured by contact catalysis are restricted to combustible gases and to vapors of inflammable liquid, e.g., carbon monoxide, benzene, toluene, xylene, and ethylene oxide. Contact catalytic combustion involves burning a mixture of a combustible gas and air on the surface of a substance which has been heated to a constant temperature; it is used to measure the heat released by the combustion of the gas-air mixture. The constant temperature necessary to burn a combustible gas by contact catalysis depends on the nature of the gas and the state of the substance's surface when heated. A catalyzer (generally platinum, nickel, and palladium) insures stable burning at relatively low temperatures. Therfore, a measuring mechanism can be stored in a refractory against released heat. In measuring high gas concentrations a Wheatstone bridge is used with two elements as a unit, each of which is pre-heated. The combustible gas is led to one side and burned so an imbalance of the bridge is detected. Lthe quantity of heat release contact combustion is proportional to the concentration of the combustible gas in the oxygen available for burning the gas. In the case of low gas concentrations, the equipment noted can detect only a part of the heat quantity. Therefore, a calorimeter with a thermocouple is used. Concretely electronic-circuits for stable measurements are a dc amplifier to amplify the thermoelectromotive force from the thermocouple, a stabilized electric power source for the gas pump, a control circuit for stability of the bridge circuit, and a recording circuit for the detected result.

10628 APTIC NO. 28354

Kaiser, Gerhard, Peter Tschoepel, and Guenther Toelg

DECOMPOSITION WITH ACTIVATED OXYGEN IN THE DETERMINATION OF EXTREMELY LOW CONTENTS OF TRACE ELEMENTS IN ORGANIC MATERIALS.

(Aufschluss mit aktiviertem Sauerstoff bei Bestimmung extrem niedriger Spurenelementgehalte in organischem Material). Text in German. Z. Anal. Chem., vol. 253:177-179, 1971. 4 refs.

To determine elements in nanogram concentrations, the principle of low temperature ashing was modified by using microwave frequencies for oxygen activation. Through contact with the oxygen plasma, the 1-gram sample burns slowly from top to bottom. The intensityof the microwave field and the position of the substance with respect to the plasma control the combustion process. The combustion products are dissolved in 500 microliters of acid, separated, and analyzed. The method was tested with radio nuclides of the volatile elements selenium, zinc, and mercury. It can be also used to determine small concentrations of beryllium in the air.

10629 APTIC NO. 28358

Ball, D. F. and D. L. Griffiths

MEASUREMENT OF DUST CONCENTRATION AND SIZE IN DUCTS AND CHIMNEYS.

Environ. Health, 79(1):10-16, Jan. 1971.

To take a representative sample from a stream of dust-laden gas in a duct or chimney, it is necessary to aspirate the gas so that its velocity into the nozzle is identical with the undisturbed stream velocity, i.e., isokinetic sampling. The use of a sharp-edged nozzle facing directly into the flow and properly mounted on a probe minimizes the disturbance to gas flow in the duct. Sampling at a higher velocity collects a reduced proportion of the coarser particles and gives an apparent solids concentration less than the true value, while sampling at a lower velocity gives an excessive total solids concentration and results in an excessive proportion of coarser particles. The sample of the gas is drawn through a cyclone and/or filter and the solids concentration calculated from the gain in weight of the cyclone and/or filter and the volume of the sample. Factors influencing site selection are discussed together with the essential features of the sampling train. The operation of internal cyclone sampling probes and external filter probes is compared, and the advantages of the former noted. Also described is the use of pilot tubes for measuring gas flow distribution. Methods of calculating gas density and gas withdrawal rate are presented.

10630 APTIC NO. 28362

Sakata, Masae

PUBLIC NUISANCE - ENVIRONMENTAL POLLUTION AND THE MEASUREMENT (1).

(Kogai - kankyo osen no sono sokutei (1)). Text in Japanese. Shin Kinzoku Kogyo (Newer Metal Ind.), no. 179:403-408, 1970.

Environmental pollution has both material and nonmaterial sources. The former are air pollution, water pollution, and food pollution; the latter are noise, vibration heat, and radio waves. Typical material pollutants are sulfur oxide, nitrogen oxides, carbon monoxide, hydrogen chloride, and dust. Measuring methods are NDIR, absorption luminous intensity, NDUV, FID, electrolytic conductivity, gas chromatography, air-samplers and impactor. Not all of the methods are equally suited to each of the above; such as surveillance measurements, which are used for continuous analysis of carbon monoxide on streets or biological oxygen demand in rivers; systematic measurement which analyze various combination of simple measurements, sometimes to obtain a basis for forecasts; and analytical measurements, such as laboratory analyses to clarify causes of contamination and determine countermeasures. Gas-chromatography analysis for air metallographic analysis of dust, and biochemical analysis are used in these studies. There is also simulation in which a phenomenon is analyzed for the influence of variables under artificial conditions. Examples are the mode test for exhaust gas from automobiles, smog chamber tests, and diffusion tests in wind tunnels.

10631 APTIC NO. 28366

Kainz, Gerald and Hermann A. Mueller

AUTOMATIZATION OF THE MICRODETERMINATION OF HALOGENS IN ORGANIC COMPOUNDS.

(Automatisierung der Mikro-Halogenbestimmung in organischen Verbindungen). Text in German. Z. Anal. Chem., vol. 253:180-184, 1971. 3 refs.

An apparatus was developed for the automatic determination, in just four min, of small concentrations of halogens in organic samples. The weighed sample is oxidized in a stream of oxygen at 1000 C. The combustion products are carried by the gas through an absorption capillary into the titration vessel. The halogen is reduced by bisulfite. Titration of halide is by a zero method. Prior to titration, the absorption solution is brought to a silver concentration of 0.00001 mol/liter. The immersed silver indicator electrode assumes a definite potential against a reference electrode. If halide appears in the absorption solution, the potential of the indicator electrode drops markedly. Silver nitrate standard solution is automatically added until the original potential is reached again.

10632 APTIC NO. 28368

Bricard, J. and P. Y. Turpin

A NEW TYPE OF SPECTROPHOTOMETRY FOR AEROSOLS.

(Un nouveau spectrophotometre d'aerosols). Text in French. J. Rech. Atmospheriques, 4(3):115-128, July-Sept. 1970. 2 refs. (Presented at the French Association for the Advancement of Science Congress, 89th, Brest, France, July 6-11, 1970.)

A spectrophotometer is capable of detecting and classifying aerosol particles down to a radius of 0.03 micron. At the moment of detection, a signal, consisting of a discontinuous sequence of photons, is locked onto each particle, and measurements are taken as a basis for estimating the average number of photons scattered per unit of time, from which the diameter of the particle can be derived by using the law of scattering. Given the uncertainty of individual readings, it is necessary to use a multilinear regression method for obtaining the granulometric distribution of particles in the aerosol. Although particles of 0.03 micron radius have been obtained with special equipment, particles as small as 0.5 micron have been detected with care on standard equipment, and particles down to a size of 0.07 micron are easily detectable. For test purposes, a suspension of monodispersed latex balls with a diameter of 0.36 micron was atomized to form an aerosol, which was then passed through a clear field.

10633 APTIC NO. 28370

Hettche, Hans-Otto

PLANT WAXES AS REPOSITORIES OF POLYCYCLIC AROMATIC HYDROCARBONS IN THE ATMOSPHERE OF INHABITED AREAS.

(Pflanzenwachse als Sammler fuer polyzyklische Aromaten in der Luft von Wohngebieten). Text in German. Staub, Reinhaltung Luft, 31(2):72-76, Feb. 1971. 18 refs.

Green kale was a suitable sampler for the determination of the rate of deposition of polycyclic aromatic hydrocarbons. The cuticle of kale is hydrophobic, the outer leaf contains 33 micron/sq m ether-soluble wax which absorbs and protects, lower aromatic hydrocarbons which would evaporate if the dust containing polycyclic aromatic hydrocarbons was deposited on a filter. Thirteen aromatic hydrocarbons including phenanthrene, anthracene, pyrene, fluoranthene, benz(a)anthracene, chrysene, benzo(e)pyrene, benzo(a)pyrene, perylene, anthranthrene, banzo(ghi)perylene, dibenz(a,h)anthracene, and coronene were isolated from a methanol extract of the wax deposit on kale. The relationship between the 3,4-benzpyrene and benzo(a)pyrene content and that of coronene and benzo(ghi)perylene is an indicator of the pollution share from automobile exhaust gases. This test is thus suitable for the determination of the cancerogenicity of the atmosphere. The emission of 3,4-benzpyrene in urgban areas can also be determined by means of paper impregnated with beeswax.

10634 APTIC NO. 28372

Koeppe, Peter

A FILTER SYSTEM FOR THE VENTILATION OF A WHOLE BODY COUNTER.

(Ein filtersystem zur Belueftung eines Ganzkoerper- Aktivitaetszaehlers). Text in German. Staub, Reinhaltung Luft, 31(2):60-63, Feb. 1971. 11 refs.

Whole body counters are used to measure the radioactivity of the human body. The necessity to ventilate premises where minute quantities of radioactive substances have to be detected by gamma ray measurement is dictated by natural radionuclides, especially by Radon 222 and by fission products resulting from above ground nuclear weapons tests. A superfine filter by itself was inadequate: the spectrum of such a filter represented a radioactive source with emission exceeding the maximum permissible level. It was replaced by a hierarchy of filter consisting of a coarse and fine pre-filter, a superfine filter, an aerosol filter, and an activated carbon filter. The latter serves the purpose of absorbing the fluctuating radon concentration. In the spectrum of the aerosol filter, fallout products in the form of Ce-144, Sb-125, Rn-106, Ph-106, Cs-137, and Zr 95/Nb95 were identified. The ventilation must be so constructed that the patients who have to remain motionless for up to 100 minutes and who are scantily dressed are not exposed to a draught.

10635 APTIC NO. 28373

Maiwald, Elenor

AN AEROSOL EXAMINATION METHOD FOR SPECIAL WORK SITES.

(Eine Methode zur Untersuchung von Aerosolen an speziellen Arbeitsplaetzen). Text in German. Staub, Reinhaltung Luft, 31(1):16-18, Jan. 1971. 6 refs.

It is often not advisable or practical to perform measurements in work sites where radioactive aerosols are generated because of the danger of contamination of personnel or of equipment or because of inconvenience. A sampling method was therefore devised which, by means of filters, yields aerosol samples which are subsequently examined. The device consists of a PVC fiber filter (Soviet filter FPP-NEL) and a membrane filter (Czechoslovak VUFS filter). Following exposure, the radioactivity of the entire filter is determined. The membrane filter captures the aerosol predominantly on its surface and thus permits the determination of aerosol particle size distribution under an electron microscope on a carbon-metal film. A special process using acetone vapors which soften and liquefy the filter material was invented to make sure that the separated aerosol remains unchanged. Tests with silicon dioxide aerosols disclosed that no agglomeration of particles occurred as a result of this process. The method was successfully used for aerosol analysis during a change of radioactive charge in a nuclear power plant and in the watchmaking industry when phosphorescent paint was used.

10636 APTIC NO. 28374

Biheller, Johann and Werner Resch

A SAMPLING AND MEASURING METHOD FOR THE ROUTINE DETERMINATION OF FLUORINE IN THE ATMOSPHERE NEAR THE GROUND.

(Erprobung einer Sammel- und Messmethode fuer die routinemaessige Bestimmung von Fluor in der bodennahen Atmosphaere). Text in German. Staub, Reinhaltung Luft, 31(1):9-11, Jan. 1971. 15 refs.

Since atmospheric fluorine concentrations are of the order of 1 micron/cu m, a large air sample is desirable. The method proposed aspires about 28 cu m air by a polystyrol filter impregnated with a 10% sodium formate solution in 50% alcohol designed to retain gaseous hydrogen fluoride. The diameter of the circular filter is 100 mm. Following aspiration, the filter is dissolved in ethyl acetate with a buffer and fluorine activity is determined by a fluorine-ion selective electrode. The measuring apparatus consisting of the F-electrode, the control electrode, and a pH meter must be calibrated with solutions of known F concentrations. The zero value of an impregnated polystyrol filter is approximately 0.3 micron F/dm sq filtering surface.

10637 APTIC NO. 28376

Crecelius, Hans-Joachim, Peter Dopfer, and Walter Vorwerg

SELECTIVE MEASUREMENT OF OZONE WITH A RECORDING INSTRUMENT.

(Selektive Messung von Ozon mit einem registrierenden Geraet). Text in German. Staub, Reinhaltung Luft, 31(1): 14-16, Jan. 1971. 6 refs.

A micrometer (a recording photometer with an auxiliary chemical reaction) with N,N,N',N'-tetramethyl-p-phenylenediamine is used for photometric determination of ozone in the atmosphere. The air to be analyzed is drawn in two streams through two reaction coils. One of the airstreams passes a selective cartridge filled with natural rubber or is mixed with butene before entering the coil. The solutions from the two coils are in two cells measured photometrically yielding the difference in the quantity of oxidants. Sulfur dioxide and most other air pollutants do not affect the determination within the range of emission concentrations. The detemination of ozone is only influenced by chlorine. The measuring range for ozone is 0-0.2 ppm.

10638 APTIC NO. 28390

Morse, K. M., H. E. Bumsted, and W. C. Janes

THE VALIDITY OF GRAVIMETRIC MEASUREMENTS OF RESPIRABLE COAL MINE DUST.

Am. Ind. Hyg. Assoc. J., 32(2):104-114, Feb. 1971. 5 refs.

While the gravimetric method of assessment of coal dust exposures is superior to the microscopic count method in the ease, speed, and precision of the final measurement, there are shortcomings in the validity of sampling and interpretation. Data and experience with the gravimetric method are presented to demonstrate the significance of these shortcomings in relation to the legal requirements and standards for use of this method in coal mines. Errors inherent in the sampling or introduced by inadequately trained technicians, using the method can have unwarranted serious import on coal mine operations. The gravimetric method has not been sufficiently correlated against pulmonary response to inhaled dust in this country to validate a standard to be strictly enforced with possibilities of severe penalties. (Author abstract)

10639 APTIC NO. 28393

Lang, Oskar and Thorkill zur Muehlen

AIR POLLUTION BY ORGANIC ACIDS AND ESTERS AND THEIR ANALYTICAL DETERMINATION.

(Luftverunreinigung durch organische Saeuren und Ester und deren analytischer Nachweis). Text in German. Zbl. Arbeitsmed., no. 2:39-45, Feb. 1971. 25 refs.

Odor emissions are frequently traced to organic acids and their esters, concentration of which can be photometrically determined with the hydroxamic acid reaction. An impinger (volume 100 ml) with 50 ml saturated barium hydroxide solution is used for sampling Sampling speed is 1.8 to 2.0 cu m/hr. The pollutant to be measured is absorbed on a 10-cm layer of silica gel. The silica gel is then extracted for 30 min with 15 ml ether. For analysis, 10 ml ether solution is mixed with 2 ml diazomethane solution and the mixture heated to the boiling point. After cooling, 3 ml hydroxylamine solution is added and the mixture heated again for 10 min. The extinction is measured and compared with a control solution. The method was used to measure ricinolic acid in the waste gas of a lacquer drying oven; a concentration of 0.6 mg/cu m was measured. The method was also used for measuring methylcyclohexylacetate and for measurements at an acetylation plant.

10640 APTIC NO. 28399

Lander, D. W., R. L. Steiner, D. H. Anderson, and R. L. Dehm

SPECTROGRAPHIC DETERMINATION OF ELEMENTS IN AIRBORNE DIRT.

Appl. Spectry., 25(2):270-275, 1971. 2 refs.

An emission spectrographic method is described to determine the concentrations of aluminum, cadmium, calcium, chromium, copper, iron, lead, magnesium, nickel, silicon, tin, and zinc in airborne dirt. Sources of airborne dirt are many and may be from outside air, from abrasion or corrosion of machinery or structural surroundings, or from the manufacturing process itself. Airborne dirt is collected on a 25 mm diameter filter paper in an in-line filter holder. To minimize the analytical time, a push-up electrode system, similar to the cellulose pellet method of Noar, was devised to burn the sample filter paper directly for the spectrographic analysis. Spectra are produced and recorded using a Baird Atomic Research direct reading spectrograph, model GX-1, with a 14 channel digital clock readout. The readout system has been interfaced with an IBM 026 card punch to automatically punch the digital clock readings into cards. In addition to listing the sample locations and element concentrations, the computer addresses the report and adds annotations to simplify the data evaluation.

10641 APTIC NO. 28408

Louis, Rudolf

KOVATS INDEX TABLES FOR THE GAS CHROMATOGRAPHIC ANALYSIS OF HYDROCARBON MIXTURES.

(Kovats-Index-Tafeln zur gaschromatographischen Analyse von Kohlenwasserstoffgemischen). Text in German. Erdoel Kohle (Hamburg), 24(2):88-94, Feb. 1971. 5 refs.

Kovats Index tables for routine gas chromatographic analysis of nonolefinic hydrocarbon mixtures are presented. They permit easy and reliable identification of peaks, even in complex gas chromatographs, without pretreatment or preseparation of samples, or time-consuming addition of pure reference compounds. The tables enable rapid and exact analysis of commercial products such as solvents, light mineral oil-fractions, or gasolines for Otto engines. (Author abstract modified)

10642 APTIC NO. 28413

Sill, Claude W., Conrad P. Willis, and J. Kenneth Flygare, Jr.

IMPROVEMENTS IN THE FLUOROMETRIC DETERMINATION OF SUBMICROGRAM QUANTITIES OF BERYLLIUM.

Anal. Chem., 33(12):1671-1684, Nov. 1961. 11 refs.

A recently published procedure for the fluorometric determination of beryllium by its reaction with morin (2',4',3,5,7 pentahydroxyflavone) has been improved significantly and its application extended. Stabilization of alkine solutions of morin toward air is accomplished without using stannite or other reducing agents. Use of diethylenetriaminepenta-acetic acid (DTPA) in place of (ethylenedinitrilo)tetraaceticacid (EDTA) prevents formation of fluorescent complex of morin with scanadium, ytrrium, and lanthanum, and greatly increases stability. A new combination of primary and secondary filters produces a threefold increase in the ratio of beryllium fluorescence to blank fluorescence, while requiring an instrumental sensitivity only one-fourth of that obtained in the previous combination. Since the exciting wavelengths are entirely in the visible region of the spectrum, errors produced by colorless ions that absorb in the ultarviolet are eliminated. One of the most important discoveries was the extensive adsorption of beryllium from alkaline solution on the glass walls of the container. The fluorescent species contains beryllium and morin in a mole ratio of 1 to 1. Detailed procedures are presented for determining beryllium in metallic thorium, zirconium, uranium, copper alloys, and aluminum in rare earth oxides and phosphates, in silicates, and in air dusts. (Author abstract modified)

10643 APTIC NO. 28417

Brown, Kenneth M., Walter C. McCrone, Richard Kuhn, and Louise Forlini

DISPERSION STAINING. PART II–THE SYSTEMATIC APPLICATION TO THE IDENTIFICATION OF TRANSPARENT SUBSTANCES.

Microscope Crystal Front, 14(2):17p., Sept.-Oct. 1963. 11 refs.

Microscope plates are presented which show the colors developed when isotropic substances, uniaxial crystals, and biaxial crystals were mounted in refractive index liquids and viewed with annular and/or central screening. Instructions are given for plotting the dispersion staining colors in analytically useful charts showing the refractive index with sodium light of the liquids used. These charts facilitate the identification of known or unknown components of a mixture and lower the level of technical background required by the microscopist. Further applications noted for dispersion staining are particle size analysis and quantitative counting analysis.

10644 APTIC NO. 28421

Hodkinson, J. R.

THE PHYSICAL BASIS OF DUST MEASUREMENTS.

p. 181-194, 1964 (?).

A study was made to determine if a sound physical basis for dust measurment by light scattering could be established. Measurements are reported which show how the extinction and scattering by irregular particles larger than the wavelength of light approximate the normal formulas of diffraction refraction, reflection, and absorption, which otherwise only apply to spheres when their diameters greatly exceed the wavelength. The polydispersity and irregular particle-shapes of many of the dusts encountered in practice result in a great smoothing and simplification of the phenomena, compared with the systems of exactly spherical particles of exactly equal diameter with which the Mie theory of light scattering is traditionally concerned. In light of this knowledge, it should be possible to formulate design principles for simple instruments capable of measuring dust concentrations independently of particle size and composition. Such instruments would afford an opportunity to control pneumoconiosis in industry. (Author conclusions modified)

10645 APTIC NO. 28431

Rasmussen, Reinhold A.

FIELD RESULTS FOR TWO FREEZOUT-STORAGE SYSTEMS DESIGNED FOR TRACE ORGANIC COLLECTIONS IN REMOTE AREAS.

Preprint, American Chemical Society, Washington, D. C., p. 63-71, 1970. 4 refs. (Presented at the American Chemical Society, 159th National Meeting, Div. of Water, Air, and Waste Chemistry, Houston, Tex., Feb. 25, 1970.)

The first of the systems described, developed for use in the tropics, is a grab sampler for microbiological and gas chromatographic analyses, constructed of two 1-liter stainless steel beakers clamped together; the bottom beaker is immersed in liquid nitrogen and the top beaker fits a blower for canister evacuation and glass pipes for ambient air intake. It is effective and reliable, compact, simple to use, battery-operated, uses a small quantity of liquid nitrogen for easier backpacking, can be easily cleaned, and is inexpensive to make. However, it requires constant attention during the sampling period, has a low freezeout efficiency, and cannot be used to calculate the concentration of th components collected in the sampled ambient air. The second system designed specifically for quantitative chemical analyses, follows the basic collection distillation, transfer, and storage concepts of the first but includes an important design change in the cryocondenser to permit quantitation, 100% collection efficiency, and ease of operation. Results of gas chromatographic analyses fro field testing show that System I, although crude, is able to collec sufficient material to obtain an appreciation of complexity of the trace organics (light hydrocarbon fraction) in a rural forest and tropical gas field. With System II, still developmental, higher concentrations than the 10-34 ppm obtained to date can be obtained by increasing the volume of the air collected, which is limited by the size of the cryocondenser's reservoir.

10646 APTIC NO. 28447

Khrustaleva V. A.

SEPARATE DETERMINATION OF ORGANIC AND INORGANIC LEAD IN GARAGE AIR.

(O razdel'nom opredelenii organicheskogo i neorganicheskogo svintsa v vozdukhe garazhey). Text in Russian. Gigiena i Sanit., no. 9:48-49, 1952.

Maximum allowable concentration for lead and inorganic lead compounds is 0.01 mg/cu m, whereas the recommended maximum allowable concentration for tetraethyl lead is 0.005 mg/cu m. A modified arrangement which reduces from 1 to 1/2 hour the time needed to take a 1-cu m air sample is described. Inorganic lead is trapped on hygroscopic wadding while tetraethyl lead is absorbed in alcohol.

10647 APTIC NO. 28451

Gurvits, S. S. and T. I. Sergeyeva

DETERMINATION OF SMALL QUANTITIES OF THE ETHYL ESTER OF ORTHOSILICIC ACID (ETHYL SILICATE) IN AIR.

(Opredeleniye malykh kolichestv parov etilovogo efira ortokremniyevoy kisloty (etilsilikata) v vozdukhe). Text in Russian. Gigiena i Sanit., no. 9:39-41, 1951.

A colorimetric method for detecting ethyl silicate is described. Determination is made on a silico-molybdenum complex formed after decomposition of ethyl silicate to silicon dioxide.

Two air sampling techniques are proposed: 1) trapping on Zeiss absorbent moistened with ethyl alcohol, and 2) trapping on filter paper moistened with 10 vol % sulfuric acid and mounted in a conventional extractor. Detection sensitivity is not specified.

10648 APTIC NO. 28441

Debiard, Raymond, Andre Fourcy, and Jean-Pierre Garrec

SOME ASPECTS OF FLUORINE DETERMINATION ACCOMPLISHED BY NEUTRON ACTIVATION OF 14 MEV IN POLLUTED PLANTS.

(Quelques aspects ddu dosage du fluor par activation sous neutrons de 14 MeV dans des vegetaux pollues). Text in French. C. R. Acad. Sci. Paris, Ser. D 264(23): 2668-2671, June 5, 1967. 8 refs.

The fluorine content in polluted apple tree and grapevine leaves was determined chemically and by radioactivation of F and the results compared. The chemical analysis followed the Willard and Winter method and determined fluorine colorimetrically (fluoride ion plus cerium-alizarine complex chelate). The radioactivation method involves the activation of a vegetable sample in a flux of neutrons of 14 MeV and simultaneous gamma spectrometric measurement of F-19. Under the conditions described, 1 mg F induce 700 impulses in the gamma spectrometer. The comparative quantities determined by the two methods were in three samples, 1389 and 1471, 1343 and 1633, 1412 and 1499 mg F respectively; thus, agreement was good. The radioactivation method has the advantage of instantaneous results but cannot be used for F levels below 200 microgram per 1 g sample.

10649 APTIC NO. 28467

Bykhovskaya, M. S. and M. D. Babina

SPECTROGRAPHIC DETERMINATION OF LEAD, ZINC, AND THALLIUM IN AIR.

(Opredeleniye soderzhaniya svintsa, tsinka i talliya v vozdykhe spektrograficheskim metodom). Text in Russian. Gigiena i Sanit., no. 7:26-30, 1956. 4 refs.

Emission spectrographic detection is sensitive to the following quantities of metals present in the gas envelope of the arc, or in the air sample, respectively (mg): lead, 0.01, 0.03; zinc, 0.01, 0.03; and thallium, 0.003, 0.01. Detection in a condensed spark is significantly less sensitive. Spectrographic determination of lead shows no advantage over chemical determination either in terms of sensitivity or selectivity, and is disturbed by the presence of tin, copper, and zinc. Spectrographic determination of zinc is less sensitive than chemical determination but has an advantage in that the presence of copper does not interfere. A spectrographic method capable of detecting 0.01 g of thallium in an arc flame has also been developed.

10650 APTIC NO. 28489

ISOTOPES AND RADIATION: NUCLEAR TECHNIQUES IN ENVIRONMENTAL POLLUTANTS CONTROL-I.

Trans. Am. Nucl. Soc., 11(1):50-51, June 1968.

Summaries are presented of papers on nuclear techniques for water pollution control in Sweden, detection of pollutants in airborne particulates by activation analysis, the application of radioisotop techniques to stream pollution problems in the pulp and paper industry, and Krypton (85) measurement of stream re-aeration rates. In Sweden, nuclear analytical techniques are used to measure the flow rate of industrial effluent, the dispersion of effluent in various receivers, (rivers, lakes, the sea), and to determine the mercury content of natural waters. In Toronto, levels of 13 trace components of airborne dusts were obtained by activation analysis. Iridium as ammonium chloroiridate can be used as a nonradioactive tag in tracing pulp and fines through paper mill lines. Accurate, direct measurements of stream re-aeration capacity are now possbile with a Krypton (85) tracer method. Such measurements will provide the necessary basis for accurately determining waste treatment requirements and costs.

10651 APTIC NO. 28492

Fineman, I., K. Ljunggren, H. G. Forsberg, and L.-G. Erwall

ACTIVATION ANALYSIS FOR SELENIUM IN ORE CONCENTRATES, SLAGS AND WASTE GASES OBTAINED IN A METALLURGICAL INDUSTRY.

Intern. J. Appl. Radiation Isotopes, vol. 5:280-288, 1959. 17 refs.

Various methods for the activation analysis of selenium in ores, slags, and metallurgical waste gases were investigated. When the ratio of selenium gamma-activity to gamma-activity of higher energy was higher than about 0.01, spectrometric activation analysis was possible. A chemical activation analysis of materials containing 0.001-0.1% selenium is easily performed if the materials are soluble. Both Se(75) and Se(81m) can be used for the spectrometric method but only Se(75) for the chemical method. Selenium data obtained by both methods are given for three materials from different stages of copper production: slag, an arsenic concentrate, and a copper concentrate. Only the chemical method gave accurate values for all materials. The use of a special spectrometric activation analysis method using the gamma-cascades of selenium was also investigated. Spectrometric activation analysis was additionally applied to the analysis of selenium in waste gas from one stage of copper production. Only an upper limit (50 micrograms Se/l for the selenium content could be established.

10652 APTIC NO. 28505

Kanagawa Prefecture (Japan)

GAS CHROMATOGRAPHY AND ITS DEVICE EQUIPPED WITH ELECTRONIC ARRESTOR TYPE DETECTOR SPECIFIED IN REGULATIONS CONCERNED WITH ENVIRONMENTAL POLLUTION STANDARDS.

(Kogai no kijun ni kansuru kisoku ni kiteisuru denshihokakugata kenshutsuki tsuki gasu kuromatografuno to). Text in Japanese. Kanagawa Prefecture Official Bull., no. 70, 4p., Dec. 1, 1970.

The standard procedures are presented for gas chromatographic and atomic absorption analysis of mercury, cadmium, zinc, copper, manganese, and iron. The bulletin stipulates the analytical procedures, including the preparation of test solutions, measuring methods, and calculating methods that are to be followed. The preparation of the cysteine acetate solution and methyl chlorida mercury standard solution, both reagents used in gas chromatography are presented. Hydrochloric acid L-cysteine (1 g), sodium acetate (775 mg), and sodium sulfuric anhydride (12.5 g) are dissolved in water to make 100 ml of solution. Benzene (pretreated by gas chromatography) is added to 100 mg of methyl chloride mercury to make a solution. This solution is removed into a flask and mixed with an additional amount of benzene to make 1000 ml of the solution. Of this, 10 ml is mixed with another additional amount of benzene to make 100 ml of solution. This dilution process should be repeated twice to make the methyl chloride mercury standard solution. One ml of the solution equals 0.1ugCH3HgCl equals 0.0799ugHg. Preparation of the prescribed test and no-load test solutions is also given in detail. As to measurement procedures, micromilliters is taken from both the test and no-load test solutions by means of a micro-syringe and injected into the gas chromatograph respectively. The height of the peak is then measured for both solutions and taken as H and Hb respectively. The v micromililiters of the methyl chloride mercury solution is similarly injected into the gas chromatograph. The height of the peak measured is then taken as Hs (100 mm or higher). When the value of H-Hb/Hs is higher than 1/20, the density C (ppm) of mercury in the form of methyl mercury in the solution can be calculated as: C(ppm) equals 0.1 times v times H-Hb/Hs times 5/V times 1/quantity of the sample (ml) times 0.799. The procedures for atomic absorbent are also prescribed in similar detail.

10653 APTIC NO. 28509

Kawanabe, Koji, Aiko Fujioka, Nagatoshi Hirasawa, Koko Kobayashi, and Kozo Maruyama

ANALYSIS OF SULFIDE, SULFITE AND CYANIDE ION BY THIN LAYER CHROMATOGRAPHY.

(Hakuso kuromatogurafi niyoru iou, aryusan, shian ion no bunseki). Text in Japanese. Bunseki Kagaku (Japan Analyst) (Tokyo), 20(1):100-102, Jan. 1971. 4 refs.

The separation and identification of sulfide, sulfite, and cyanide ions among 20 common anions were examined on two kinds of plates by the use of three developing solvents. The SO3(2-), I(-), SCN(-), Br(-), NO3(-), ClO3(-), BrO3(-), Cl(-), IO3(-), Fe(CN)6(3-), and Fe(CN)6(4-) anions were successfully separated with acetone-water (10:1) on a plate of HCl- treated silica gel containing 5% soluble starch and 5% sodium carbonate. The detection of S2O3(2-) was disturbed and that of CN(-) obscured. The anions SO3(2-), S(2-), NO2(-), S2O3(-), CrO4(2-), C2O4(2-), AsO4(3-), SO4(2-), F(-), PO4(3-), and BO2(-) anions were separated with methanol-n-butanol-water (3:1:1) on the same plate. The CN(-) ion was not detected, but was separated as Hg(CN)2 by acetone-benzene (1:1) on a plate of silica gel containing 5% soluble starch. Fuchsin for SO3(2-), 5% silver nitrate for S(2-) and cupric-acetate benzidine-acetate for Hg(CN)2 were satisfactory as identification agents. When the oxizing ions IO3(-), BrO3(-), ClO3(-), CRO4(2-), NO3(-), NO2(-), FE(CN)6(3-) or AsO4(3-) was added to SO3(2-) or S(2-), the present analysis was applicable up to 5 hours after the specimen preparation. The sensitivity of the present method is concluded to be improved by optimizing the plate preparation.

10654 APTIC NO. 28512

Koyama, Hiroaki and Hiromi Kanbe

DISCRIMINATIVE DETERMINATION OF STACK GAS BY USING GAS TRACER (VII). TRACING OF STACK GAS RELEASED FROM TALL STACK BY SF6.

(Gasu toresa ni yoru haigasu no senbetsu sokutei. Dai-7-ho. SF6 ni yoru koentotsu kara no haien no tsuiseki sokuteiho). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1): 93, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 10th, 1970.)

Sulfur fluoride was used as a tracer to investigate the diffusion of smoke from collective high-stacks in industrial areas. Construction of a gas bomb heating device with pressure reduction valves, rotameter, and stop valve permitted stable, continuous emission of up to 70 kg/hr sulfur fluoride. A compact injection device was obtained by using polyvinyl chloride with steel wire. A collection device with an intake velocity of 0.2 l/min was constructed. Equipment for adjusting the sampler was installed inside, and a plastic external case was constructed to avoid, for example, variation in flow velocity. A prefabricated container was used to preserve the samples collected and the sampler itself.

10655 APTIC NO. 28513

Yamanaka, Chiyoe, Yasukazu Izawa, and Tsunehisa Tanaka

FUNDAMENTAL STUDY OF DETECTION OF AIR POLLUTION BY COLOR LASER RADAR.

(Kara resa reda ni yoru taiki osen busshitsu no kenshutsu ni kansuru kisokenkyu). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):95, 1970. 4 refs. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 10th, 1970.)

So that laser radar could be applicable to specific atoms, molecules, and ions, a method was devised that utilizes the resonance scattering of the color laser light for which oscillation wavelength can be controlled arbitrarily. When a methanol solution of rhodamine 6G, together with diffraction grating, was used, a laser light with an oscillation wavelength width of 0.1 A and maximum output 100 KW was obtained, and the wavelength could be changed continuously from 5700 6300 A. With this laser beam, resonance scattering of the D-line of sodium was obtained. Color laser radar beam can be used for detecting sulfur dioxide, for example. Sulfur dioxide has a resonance band at 2500-3500 A. Color laser that resonates with this transition can be produced by rhodamine 6G and rhodamine B.

10656 APTIC NO. 28514

Oba, Hiroshi, Masauki Kawazoe, and Takeo Yamamoto

MICROBIOLOGICAL ASSAY METHOD FOR SULFUR COMPOUNDS IN ENVIRONMENTAL POLLUTION. (NO. I). MICROBIOLOGICAL ASSAY METHOD FOR SULFATE IN RAINWATER BY MEANS OF CULTIVATION OF ESCHERICHIA COLI.

(Biseibutsu teiryoho ni yoru iokagobutsu no kankyonodo no sokutei. Sono-1. Amamizu chu no ryusan ion no teiryo). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):46, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 10th, 1970.)

A microbiological assay of SO4(-2) in rainwater collected in deposit gauges and dust jars was attempted by means of E. Coli B(H) culture. Up to about 0-10 ppm SO4(-2), linearity was observed in the plots of the relationship between SO4(-2) concentration and the light absorption coefficient due to bacterial growth. In the actual experiment, E. Coli B(H) was cultured at 37 C for 10-12 hours, then centrifuged and washed twice in 0.9% sodium chloride. The culture was subsequently diluted and added dropwise and aseptically into standard solution containing SO4(-2) and culture medium. After cultivation for 30-33 hrs at 37 C, the light absorption coefficient was measured by a photoelectric colorimeter at 630 millimicron. The data were compared to those obtained by BaCrO4 solid method and gravimetric methods.

10657 APTIC NO. 28522

Matsui, Shigeru and Kiyoshi Ando

ON VEHICLE EXHAUST GAS (CO, H2).

(Jidosha haiki gasu (CO, H2) bunseki kei ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):258, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 10th, 1970.)

A new, portable carbon monoxide detector is based on miniaturized gas chromatography. Air is used as carrier gas, and hydrogen as well as CO in vehicle exhaust gas can be measured. The circuit consists of a Wheatstone bridge, standard resistor, standard and measurement cells (with platinum coil, combustion-type, and glass-made), balancing resistor, sensitivity adjustment resistor, and millivoltmeter. The readoff is direct rather than amplified. For the flow circuit, the carrier is air, and air adjustor, manometer, gas-quantification cock, standard and measurement cells, trap, column filled with molecular sieve 5A, flowmeter, and injection inlet for syringe are used. In addition, there is a constant temperature device 3for the cells. Some characteristics of the device are presented.

10658 APTIC NO. 28524

Yatabe, Teruo, Y. Ishihara, and Hisashi Fukuzawa

DETERMINATION OF SULFUR OXIDES IN ATMOSPHERE. NO. 2. INVESTIGATION ON ERRORS OF AIR POLLUTION METERS.

(Taikichu no io sankabutsu no sokutei ho. Dai-2-ho. AP meta no gosayoin no kaiseki). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):40, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 10th, 1970.)

Sulfur oxides in air can be measured by electroconductivity or by rosaniline methods, but the obtained values do not always correspond. To clarify the inconsistency, air pollution meters of various makes were studied to observe the effects on measurements of gases other than SO2 and other error factors. The repetitive accuracy of the indicators was good, with a standard error of 2 ppb per 100 ppb SO2, but there were problems of inherent bias. The problems appeared due to the change in gas volume with temperature change, evaporation loss of absorption liquid, temperature change at the poles, and adhesion to filters. A comparison of the meters by means of a standard gas showed discrepancies in measurements, and bias was observed between measured values and calculated values. However, corrections in liquid loss and filter led to congruent values. Acidic gases were not effective up to about 0.2 ppm.

10659 APTIC NO. 28530

Okita, Toshikazu, Shuji Yamashita, Ryuichi Sugai, Hiromasa Nakagawa, K. Kaneda, and Masaki Mori

CALIBRATION AND FIELD TEST OF THE ATMOSPHERIC HYDROGEN FLUORIDE RECORDER.

(Taikichu fukkasuiso jidokirokukei no kakusei to yagaishiken ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):87, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 10th, 1970.)

Dynamic calibration of a hydrogen fluoride recorder was performed; calibration of both the collection device and the analyzer is necessary for an automatic fluoride analyzer. An appropriate HF concentration from an HF permeation tube was simultaneously led to the automatic analyzer and to an Na2CO3 filter so that measurements could be compared. The flow rate was 30 l/min for each, and the tubes were mainly of Teflon and Taigon. The correlation coefficient for the two sets of data was 0.83, and the regression equation was y equals 0.97x plus 0.25, where x constitutes measurements from the automatic analyzer and y those from the Na2CO3 filter. In a field experiment, samples were taken from aluminum electrolysis and phosphorus fertilizer plants in Naoetsu, Niigata Prefecture.

10660 APTIC NO. 28537

Katoh, Tatsuo and Mutsuko Goda

TOTAL ANALYSIS OF AIR POLLUTANTS, NO. 21: GAS-CHROMATOGRAPHIC STUDY OF CO IN URBAN AIR.

(Taiki osen no zenbunseki. Dai-21-po. Kankyo CO no GC-ho ni yoru chosa). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):90, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 10th, 1970.)

A new, expedient method of measuring carbon monoxide uses gas chromatography. Air samples are collected by 5-ml polyethylene syringes, which are then capped and taken to a laboratory for analysis. Later, needles are attached to the syringes so that 2 ml of the sample can be analyzed. Gas chromatography is performe with a 3 mm in diameter and 2m long and filled with molecular sieve 13x. At constant temperature, a Raney nickel catalyst tube (10 cm) is attached and heated to 260 C. The sample is subsequently passed through a hydrogen-flame ionization detector. The carrier gas is hydrogen, to which nitrogen is added in the detector section. Carbon monoxide in the sample air is separated in the column and reduced to methane, which in turn is detected by the hydrogen-flame ionization detector. In this fashion, 0.1 ppm CO can be determined. The chromatogram can be obtained as a sharp peak after fluctuations due to large amounts of oxygen and nitrogen. Analysis requires 2 min. This method was used to measure carbon monoxide levels in Toyama and Takaoka.

10661 APTIC NO. 28561

Altshuller, A. P.

INSTRUMENTATION FOR MONITORING AIR POLLUTANTS.

Analysis Instrumentation, vol. 6:3-6, 1968. (Presented at the Instrument Society of America, Annual Symposium, 14th, Philadelphia, Pa., May 19-22, 1968, Paper 68200.)

The Chemical and Physical Research and Development Program of the National Center for Air Pollution Control has as one of its responsibilities the performance of instrument research and development on both an inhouse and contract basis. General criteri for improved instrumentation include simplicity of construction and operation, reliability and reproducibility of operation over long time intervals, adequate sensitivity to meet requirements of specific applications, and specific response to pollutants of interest. Additional criteria which pertain to continuous air monitoring operations are also indicated. The present instrumentation for monitoring of emissions particularly emphasizes the non-dispersive infrared principle. For atmospheric analysis, conductimetric coulometric or galvanic, colorimetric, flame ionization, and non-dispersive infrared all are used or compete for application to individual pollutants. Some examples are presented to illustrate possibilities and problems in future instrument development. These include the measurement of oxidants and ozone, carbon monoxide, nitric oxide, and nitrogen dioxide. Limitations concerning multicomponent analyzers are also indicated. While gas chromatography is excellent for carbon monoxide, carbon dioxide, hydrocarbons, peroxyacyl nitrates, and possibly nitric acid, substrate problems make it impossible at present to measure sulfur dioxide, nitrogen oxides, ozone, hydrogen sulfide, and ammonia at atmospheric concentrations of interest. Problems concerning ultraviolet and infrared spectroscopy, Raman spectroscopy, electron impact spectroscopy, microwave spectroscopy, and mass spectroscopy are also mentioned. In addition, there is a need to determine dosages experienced by individuals in varying environmental situations by development of very small and lightweight dosage instruments.

10662 APTIC NO. 28562

Zurlo, Nicola and Angela Maria Griffini

MEASUREMENT OF THE SO2 CONTENT OF THE AIR IN THE PRESENCE OF OXIDES OF NITROGEN AND HEAVY METALS.

Med. Lavoro (Milan), 53(5):330-335, 1962. 6 refs.

A study was conducted to eliminate the interference of oxides of nitrogen and heavy metals, in the colorimetric method of West and Gaeke, for the determination of atmospheric sulfur dioxide. It has been proved by preliminary tests, that the interference of nitrogen dioxide is not due to the reaction of NO2 with SO2, as is generally believed, but is due to the reaction of NO2 with fuchsine or with fuchsine which has reacted with SO2. To eliminate the interference it is enough to detroy the NO2; keeping this in mind, urea, sulphanilic acid, and o-toluidine were tried: good results were obtained with o-toluidine. For the total destruction of the nitrites (10 microgram) it is necessary to use at least 0.2 ml of a 1% o-toluidine solution for every 10 ml of the sample, which reduce the chromatic intensity only by 20%. Tetrachloromercurate protects the SO2 from oxidation; the protection however is incomplete in the presence of heavy metals, especially of iron-salts. With manganese and chromium SO2 was oxidized in stoichiometric quantities corresponding to the reduction of metals of inferior valence; with ferrous and ferric iron SO2 was completely oxidized, even when present in a notably higher concentration than the stoichiometric equivalent. Iron oxidizes SO2, itself being reduced to the ferrous salt, which is reoxidised by the oxygen contained in air, thus acting as an oxygen carrier. To estimate SO2 in the presence of iron salts one has to block the iron by adding a chelate to the solution, more precisely, ethylenediaminetetracetic acid (EDTA), (70 microgram of EDTA to every 10 microgram of Fe). The EDTA does not interfere with the chromatic reaction of fuchsine-SO2, and protects SO2 completely. (Author summary modified)

10663 APTIC NO. 28566

Sugawara, Naoki, Tetsutaro Kohgo, Ryosaku Endo, and Toshiko Sakamot

THREE, FOUR-BENZPYRENE IN SUSPENDED PARTICULATES AS AIR POLLUTIONS. I. EXTRACTION OF 3,4-BENZPYRENE.

(Fuyu baijin chuno 3,4-benzpyrene no teiryo nitsuite (dai 1 po) (3,4-benzpyrene chushutsu ni kansuru kisoteki jikken). Text in Japanese. Hokkaido Ritsu Eisei Kenkyushoho, vol. 18:140-142, 1968. 7 refs.

Airborne particulates were sampled by a high-volume sampler on glas wool, which was subsequently cut into pieces of appropriate size an subjected to vacuum sublimation. The extract was dissolved in benzene and sealed in a tube. The crude benzene sample was subjected to one-step separation by thin-layer chromatography. The 3,4-benzpyrene part was scraped off, extracted by benzene, centrifuged, and the upper part was studied by a fluorescent spectrophotometer. The relation between extraction time and the amount of 3,4-benzpyrene detected on the thin layer chromatoplate was studied. Almost all the 3,4-benzpyrene contained was found to be extracted in 15 min. The effect of extraction temperature on the amount of 3,4-benzpyrene detected was also studied. At 350 C, 144% more was extracted than at 200 C, 16.5% more than at 250 C, and 7.5% more than at 300 C. Little difference was observed between 250 and 350 C extraction, but this does not exclude the possibility of other polycyclic aromatic hydrocarbons being extracted differently according to the difference in temperature or time. In dilute samples a linear relationship was found between the amount of detected 3,4-benzpyrene and that of the sample spot. In concentrated samples, however, no linear relationship was observed. No difference was found between the separation power of MN and KG- chromatography. It is concluded that separation of purified 3,4-benzpyrene is difficult by a one-step method, and a two-step separation is being studied.

10664 APTIC NO. 28572

Boehlen, B.

ON SPECIAL PROBLEMS IN THE TECHNICAL CHARACTERIZATION OF AEROSOLS.

(Ueber spezielle Probleme der messtechnischen Kennzeichnung von Schwebestoffen). Text in German. Chimia, 23(1):1-11, Jan. 1969. (Presented at the Schweizerischen Treffen fuer Chemie, 2nd, Basel, Switzerland, Sept. 12-13, 1968.)

Particle size distribution and concentration are important characteristics of aerosols with respect to their physical, chemical, and hygienic properties. Methods of particle sampling are described along with concentration measurement by weighing or microscopic counting and particle size determination by microscopic sizing. Also discussed are light scattering methods for the simultaneous measurement of concentration and particle size. The influence of particle scattering properties, nonisokinetic sampling and coincidence loss on the accuracy of measured values are noted. Finally, a device for the external dilution of highly concentrated aerosols is described.

10665 APTIC NO. 28576

Dodd, A. E. and G. Garratt

A COMPARISON OF CONSTANT-SPEED AND ACCELERATION TESTS FOR THE MEASUREMENT OF SMOKE FROM DIESEL-ENGINED VEHICLES.

Motor Industry Research Association, Nuneaton (England), Rept. 1968/6, 24p., March 1968.

Full-load measurements were carried out, using a chassis dynamometer, on 16 diesel-engined vehicles to investigate the relationship between the maximum steady-speed smoke density and that measured in acceleration tests. Fifteen of the vehicles were fitted with naturally-aspirated four-stroke engines, ranging in swept volume from 91 to 761 cu in., while the sixteenth had a 298 cu in. turbocharged, scavenge-blown two-stroke engine. Visual measurements were made using a smokemeter while traces of the photocell output of the smokemeter and of engine speed were obtained during the acceleration tests using an ultraviolet recorder. The three basic types of engine test investigated were steady-speed, acceleration of the engine at full load with the vehicles stationary (free acceleration), and acceleration of the vehicle at various controlled rates over a normal usable speed range, defined as 35 to 100% of maximum-power speed. The latter test was carried out from both part load and full load at the lowest speed; the effect of starting from speeds below 35% on those vehicles having higher speed engines was also studied. The free acceleration test proved to be unsatisfactory as a means of indicating the steady-speed smoke emission of the four-stroke vehicles tested since no consistent relationship between the two results could be found for individual vehicles. Slower controlled accelerations, starting from part load at the lowest speed, produced better overall results but were still unsatisfactory for those engines which developed maximum smoke densities at the lower engine speeds. Where such engines have a wider usable speed range, these deficiencies can be overcome to some extent, and the smoke level at the 35% point obtained, by starting the accelerations from a lower speed. The use of a recorder is imperative in these cases. The controlled accelerations starting from full load at the lowest speed gave the best correlation with steady-speed results for the limited number of vehicles tested, including those with engines which were smoky at the lower speeds. A similar range of acceleration tests was carried out on the turbocharged, two-stroke- engined vehicle; no agreement could be found with steady-speed results in any test and further work is necessary if a suitable method is to be devised. (Author summary modified)

10666 APTIC NO. 28583

Valic, Fedor and Morris B. Jacobs

ASSESSMENT OF MERCURY AIR CONCENTRATIONS IN A WORK ENVIRONMENT.

Am. Ind. Hyg. Assoc. J., 26(3):266-269, May-June 1965. 12 refs.

Ultraviolet photometry with mercury vapor meters and the iodine- iodide method were employed to determine mercury concentrations in a mercury mine and smelter in Yugoslavia. Mercury vapor concentrations, as obtained by ultraviolet photometry, were 0.1 to 2.0 mg/cu m in the mine and 0 to 2.0 mg/cu m in the smelter. Total mercury concentrations were 0.16 to 4.89 mg/cu m in the mine. The higher values obtained by the iodine-iodide method imply that monitoring solely with mercury vapor concentration devices may be inadequate for industrial hygiene purposes.

10667 APTIC NO. 28585

Lyando, R. E. and B. I. Vasil'ev

CHROMATOGRAPHIC METHOD OF COMPLETELY AUTOMATIC ANALYSIS OF FLUE GASES.

Thermal Eng. (English translation from Russian of: Teploenergetika), 16(9):70-73, Sept. 1969. 3 refs.

A chromatographic system is described that permits the automatic analysis of the complete composition of flue gases. The system uses one instrument for the analysis of combustible components (hydrogen, carbon monoxide, and methane) and another for determining incombustible components (oxygen and carbon dioxide). Complete separation of combustibles takes place in one column filled with activated carbon. The other instrument has one detector but several columns connected in series, including two filled with molecular sieves. By removing nitrogen from the system the molecular sieve columns reduce the analysis of incombustible components to 4-4.5 min. Under optimum conditions, the sensitivity threshold of this instrument with respect to oxygen is 0.75%. The other instrument has a sensitivity of 0.008% for methane, 0.015% for carbon monoxide, and 0.001% for hydrogen. Analysis requires 4.5 min. Both instruments performed satisfactorily when tested under industrial conditions at a power station.

10668 APTIC NO. 28592

Her Majesty's Factory Inspectorate, Dept. of Employment and Productivity

METHODS FOR THE DETECTION OF TOXIC SUBSTANCES IN AIR: HYDROGEN SULPHIDE.

Booklet no. 1, 10p, 1969.

A method for the determination of hydrogen sulfide in the atmosphere was described which requires 125 ml of atmosphere as sample. The air is drawn through lead acetate paper which is clamped in a holder. The stain produced on the paper should be 10 mm in diameter and only on that side of the paper exposed to the gas. If stains are visible on both sides of the paper, new test papers should be used. The preparation and preservation of test papers were also discussed.

10669 APTIC NO. 28621

Nakano, Kinji and Toshio Odairo

MEASUREMENT METHOD FOR AMBIENT AUTOMOTIVE EXHAUST GAS CONCENTRATIONS.

(Kankyo taikichu jidosha haiki gasunodo no sokuteiho). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):243, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

By using the advantages of bag-sampling, a multiple-point-average sampling device for the continuous sampling of automobile exhaust gases was developed. It can be made to record either a 15-minute average of three locations, 30-minute averages of six locations, or 60-minute averages of 12 locations. Chemical techniques for the analysis of the samples for lead in suspended particulates are described for use with glass-fiber filters and membrane filters. Atomic absorption spectrophotometry is utilized with the calibratio line of 2833 A.

10670 APTIC NO. 28655

Andersen, Ariel A.

NEW SAMPLER FOR THE COLLECTION, SIZING, AND ENUMERATION OF VIABLE AIRBORNE PARTICLES.

J. Bacteriol., vol. 76:471-484, 1958. 15 refs.

A new model of Andersen aerosol sampler with which airborne particles are sized and counted is described. The instrument consists of a series of six stages through which the aerosol sample is consecutively drawn. The device is pressure sealed with gaskets and three adjustable spring fasteners. Each stage contains a plate perforated with 400 holes and immediately below a petri dish of agar culture medium. The size of the holes is constant for each stage, but is smaller in each succeeding stage. The sampler operates at a flow rate of 1 cfm. Experimental studies showed that wall loss is negligible, there is no slippage of bacterial particles, the instrument is extremely sensitive, and particle size discrimination makes it possible to calculate the particle size spectrum of bacterial aerosols. The sampler provides a suitable means of assessing the health hazard in particulate air pollution.

10671 APTIC NO. 28667

Elliott, William G.

BALLOON BORNE POLAR NEPHELOMETER MEASUREMENTS OF THE ATMOSPHERE. (FINAL REPORT).

Spectrametrics, Inc., Burlington, Mass., Contract F19628-67-C-0412, Proj. 7670, Task 767004, Unit 76700401, Rept. AFCRL-70-0084, 100p., Feb. 1, 1970. 8 refs.

NTIS, DDC: AD 712091

A series of measurements made with a balloon borne polar nephelometer are described. Measurements of the angular optical scattering function were made at 0.4 micron and 0.65 micron at scattering angles of 25, 45, 90, 135, and 155 degrees; observations at each angle were made for polarizations both parallel to and perpendicular to the plane of scattering. Measurements were made approximately every 30 meters during ascent from ground level to an altitude of approximately 25 km. Calibrated values were obtaine of the scattering function versus altitude for each angle of observation and each wavelength and polarization. (Author summary modified)

10672 APTIC NO. 28671

Gilcreas, F. W. and E. R. Hendrickson

EQUIPMENT AND INSTRUMENTATION FOR AIR SURVEYS.

Fla. Eng. Ind. Expt. Sta. Bull., no. 83:21-26, 1956. 8 refs.

Many of the important substances causing air pollution lend themselves to measurement with continuous and automatic sampling. Several instruments have been developed for continuous measurement of sulfur dioxide in the air. One of these, the Thomas Autometer, is shown schematically; the basic principle of measurement which this device employs is electrolytic conductivity. Unfortunately, other gases which may be present in the sampled air, along with sulfur dioxide, will also produce changes in the conductivity. Operation of the Autometer is described, and it is commercially available in either of two versions: the 'integrating type' and the 'nonintegrating type.' Another approach to the problem of instrumentation for sulfur dioxide sampling is the Titrilog, which operates by titration of the atmospheric contaminant with the titer generated electrolytically. A noncommercial photometric sulfur dioxide recorder uses a starch-iodine solution which is decolorized as air samples containing sulfur dioxide are bubbled through. A continuous fluoride analyzer is described. The magnesium salt of 8-hydroxyquinoline fluoresces under ultraviolet light, and it has been demonstrated that the fluorescence is quenched by minute concentrations of hydrogen fluoride. Several instruments have been described to monitor smokes, dusts, and mists, which depend on the light-scattering properties of particles in suspension.

10673 APTIC NO. 28681

Bennett, Brian J., Allan Walker, and Lynsay Robertson

AIR FILTER TESTING: A GUIDE TO THE EVALUATION OF FABRIC FILTERS. PART II. TEST METHODS AND CODES.

Aust. Refrig. Air Cond., Heat. 23(7):52-54, July 1969.

The testing and rating of medium efficiency air filters is described. The important performance factors to consider in selecting air filters are clean resistance, efficiency, resistance build-up characteristics, and dust holding capacity. The main reason for the disagreement among engineers as to how filters should be rated and what rating tests should be applied is the difficulty in determining what it is the filter is to collect. Two basic approaches to the problem are the Air Filter Institute (A.F.I.) Test Code and the British Standard (B.S.2831) Test Code. The main difference between the two is the use by the former of a combination dust which comprises a granular portion, a carbonaceous portion, and lint, whereas the British Standard code uses a straight granular type dust. Another difference is the division of the dust by the British test code into two groups, with average sizes of 5 and 22.5 microns. The granular portion of the dust used in the A.F.I. test has an average size of 3 microns. The A.F.I. approach to the problem of establishing the actual composition of atmospheric pollutants is the reproduction of these conditions with a test dust. An advantage of the British Standard test is the use of a number of test dusts with different size characteristics making it possible to determine how a particular filter reacts in relation to a range of pollutant sizes. However, it is extremely difficult to determine exactly what the composition of the pollutants are in any particular area.

10674 APTIC NO. 28690

Fensom, A.

APPARATUS FOR THE DETECTION OF DANGEROUS CONCENTRATIONS OF CARBON MONOXIDE IN AIR.

Lab. Pract. (London), 20(1):49, 52, Jan. 1971. 3 refs.

A simple, inexpensive apparatus is described that will give visual indication of the presence of toxic concentrations of carbon monoxide. The indicating reagent is palladium chloride adsorbed on silica gel which changes from yellow to gray in 15 min in the presence of 200 ppm CO. The reagent reverts to its original color in further exposure to clean air. The apparatus, which operates continuously, has been used for two years to monitor areas where high pressure carbon monoxide is required in semi technical experimental work.

10675 APTIC NO. 28691

Ball, D. F. and D. L. Griffiths

MEASUREMENT OF DUST CONCENTRATION AND SIZE IN DUCTS AND CHIMNEYS. PART V. PARTICLE SIZE--THEORY.

Environ. Health, 79(2): 33-35, Feb. 1971. PART VI. PARTICLE SIZE--METHODS: SIEVE ANALYSIS--50 MICROMETER TO 3 MM. Ibid, 79(2):36-42, Feb. 1971.

A knowledge of the distribution of dust particle sizes is vital in the choice of a suitable gas-cleaning plant and also in monitoring the efficiency of a plant already in service. Four of the most widely practiced size analysis methods are discussed in detail in the following order: sieving, sedimentation, microscopy, and pulse counting. Phenomena utilized by these method to discriminate between particles of different size are, respectively, physical barrier, terminal settling velocity, imaging, and electrical resistance. The advantages and disadvantages of each method are noted. Also discussed are methods of presenting size distribution data in graphic form and the importance of particle separation prior to analysis.

10676 APTIC NO. 28694

Furukawa, Naomitsu

AIR POLLUTION WATCH SYSTEM.

(Taiki osen kanshi system). Text in Japanese. Ohm, 55(13):26-28, 1969.

The Japanese air pollution monitoring network is briefly described and the relative merits of analog and digital telemetry systems are discussed. The network is comprised of monitoring stations connected by telemetry links to data processing command centers. The monitors collect and reduce both pollution and meteorological data to a form compatible with the telemetry system and transmit these data to the processing/command centers. Monitors are designed for automatic unmanned operation with periodic (1-2 week intervals) maintenance visits by a roving technician. Both analog and pulse code digital telemeter systems are in use and each has advantages under certain restrictions. Analog is simple to install and maintain but is limited to 18 information items per circuit. Some transmission noise is inherent in this system, but it is usually tolerable and continuous recording of a monitor is practical. The pulse code digital system is more accurate, is unaffected by transmission noise, and can handle much more information. It affords economy in that it is easier to couple to data processing equipment and computers. The trend toward centralization of information and the increasing requirements for data interchange among autonomous bodies is creating a pressure to convert existing analog data and systems to digital to create a single common system. This coupled with the use of electronic computers will make air pollution forecasts based on analysis of current and stored data a practical feat.

10677 **APTIC NO. 28698**

Trowell, J. M.

REACTION OF NITROGEN DIOXIDE WITH PORAPAK Q.

J. Chromatographic Sci., 9(4):253-254, April 1971. 3 refs.

Injection of nitrogen dioxide in a glass chromatographic column packed with microporous polymers (Porapak Q or Chromosorb 102) resulted in nitration of the aromatic ring of the polymer and the appearance of nitric oxide and water. The observed interaction of NO2 with the polymer packings makes the latter unsuitable for analyzing gases with significant NO2 concentrations.

10678 **APTIC NO. 28708**

Thoen, Gerhardt N.

GAS SAMPLING PROBE.

(Weyerhaeuser Co., Tacoma, Wash.) U. S. Pat. 3,559,491. 3 p., Feb. 2, 1971. 7 refs. (Appl. March 10, 1969, 10 claims).

A probe is disclosed for sampling particulate and moisture-laden gases, especially those from combustion furnaces such as black liquor recovery furnaces, power boilers, and lime kilns. The probe is much simpler than known gas sampling apparatus, has fewer parts, and is capable of operating efficiently over extended periods of time. The probe comprises a tubular shield having an open end in the gas flow path and a tubular sampling probe mounted concentrically within the shield. The probe is made of low heat conductive subtance permeable to moisture. Particularly useful are ceramic materials. The probe allows moisture to evaporate through it to the atmosphere, cools the gas sample without degradation of its contents, and is corrosion resistant. Particulate matter which deposits in the probe is removed periodically by flushing the tubular probe with compressed air or other fluid. Valve means periodically and selectively connect the flushing fluid to the probe. (Author abstract modified)

10679 **APTIC NO. 28735**

Loeffler, Friedrich and Heinz Umhauser

AN OPTICAL METHOD FOR THE DETERMINATION OF PARTICLE DEPOSITION ON FILTER FIBERS.

(Eine optische Methode zur Bestimmung der Teilchenabscheidung an Filterfasern). Text in German. Staub, Reinhaltung Luft, 31(2):51-55, Feb. 1971. 4 refs.

An experimental arrangement for photographing and examining the deposition of particles on fibers is described. Special attention is given to the electrostatic charge of the particles and to filming particle trajectories. The films are evaluated quantitatively. Results of measurements made on quartz particles of 5 and 10 millimicron show that the fraction of particles impinging on and adhering to the fiber at the first collision decreases with increasing particle velocity. The examined range of velocity reached was from 0.3 to 1.0 m/s. The disagreements between the experimental and theoretical results for collection efficiency are explained in this way.

10680 **APTIC NO. 28738**

Okita, Toshiichi, Ryuichi Sugai, and K. Kaneda

SEPARATION AND SUSBEQUENT DETERMINATION OF ATMOSPHERIC PARTICULATE AND GASEOUS FLUORIDES.

(Gasujo oyobi ryushijo fukkabutsu no bunrisokuteiho). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):88, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

The effects of gaseous fluorides (mainly hydrogen fluoride) and particulate fluorides on plants are quite different, and the separation of the two types is desirable. Separation by filters was attempted. Millipore AA filters are the most appropriate for capturing the particulates and letting the gas through 100%. A polypropylene filter allowed 50% of the particulates to penetrate and was not appropriate. Neither was Teflon LSWPO because it contained fluorine. Tests of tubes for gas capture indicated that aluminum pipes have low intake velocity and, with their length extended, can collect 100% of the gas. Collection efficiency was the best for a glass spiral containing 1% dried Na2CO3 solution.

10681 **APTIC NO. 28755**

Tanaka, Katsuhiko, K. Fukaya, Kiyoshi Yoshitani, S. Kanno, and Shozo Fukui

A FEW PROBLEMS ON DETERMINATION METHOD OF LEAD IN AUTO-EXHAUST GAS. (Jidosha haiki gasuchu no namari no teiryoho no mondaiten). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 4(1):252, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

Methods of determining lead in automobile exhaust gas were studied. When gasoline is burned in an engine, tetraethyl lead antiknock additives react with lead reducing agents to form various lead compounds. In addition, water in the exhaust gas condenses in the exhaust pipe, resulting in water droplets containing lead. When the end of the exhaust pipe was heated by a ribbon heater and impingers containing a nitric acid absorptio liquid were used, atomic absorption spectrophotometry of the sample gas showed that the first-stage impinger could not capture all the lead in water droplets. Large amounts of lead was also collected in the second impinger. Even the collection of exhaust gas behind the ribbon heater by means of a vacuum bottle and subsequent shaking of the gas with nitric acid solution showed that there are large variances in the concentration of lead measured. This indicated that not only water, but also dusts affect the reproducibility of the experiment.

10682 **APTIC NO. 28772**

Hirata, Yusuke and Takashi Nakadoi

THE APPLICATION OF RUBBER CRACKING TO ATMOSPHERIC OZONE ANALYSIS.

(Gomu kiretsu ho ni yoru kukichu no ozon nodo no kento). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):259, 1970. 2 refs. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

A simple method for determining atmospheric ozone concentration was developed. Air is purified by passage through active carbon, then passed through a flow meter and a mercury lamp, where ozone is created. The ozone is passed through a glass container with a piece of rubber inside; the rubber is subjected to 360 g of weight. The ozone in the container is measured by means of an ozone meter. After a certain period of exposure, the piece of rubber is taken out, cut in the middle, and its cracks observed. The number of cracks counted and their depths are measured. Observations with a 100 X microscope showed that of the five types of rubber tested, those that are mainly natural rubber and contain carbon, zinc white, and sulfur are most sensitive to ozone.

10683 APTIC NO. 28787

Katoh, Tatsuo, Tomohiko Ishiguro, Chikako Kakuda, Seiji Takahasi, and Takeshi Murata

TOTAL ANALYSIS OF AIR POLLUTANTS NO.22: GC-MASS ANALYSIS OF TYPICAL ODOR POLLUTION.

(Taiki osen no zenbunseki. Dai-22-ho, GC-MASS ni yoru daihyoteki akushu no bunseki). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):91, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

Analyses of odors were attempted to gain further knowledge of gas chromatography mass spectroscopy (GC-MASS) and to improve its efficiency and capabilities. The sample odor liberated into the atmosphere was collected in a vacuum bottle with a Teflon cock. The sample was then released by a vacuum pump in the heated state, and led through liquid oxygen to be cooled and removed to its gas-chromatography test tube. Part of the sample was analyzed by the hydrogen flame ionization method. The GC-MASS used was Shimadzu LKB 9000. For gas chromatography, helium was used as carrier gas. The sensitivity was as high as that obtained by high-sensitivity gas chromatography. Due to the rise of base at high temperature, however, the applicable temperature range was narrower. In addition, the presence of even simple components such as water or hydrogen sulfide can interfere with mass analysis.

10684 APTIC NO. 28795

Rimberg, D. and D. Keafer

EVALUATION OF A COMMERCIAL ELECTROSTATIC AEROSOL SAMPLER.

Atmos. Environ., 5(1):65-66, Jan. 1971. 3 refs.

The collection efficiency of a commercial two-stage electrostatic sampler (with separate charging and precipitating sections) was measured at flow rates of 4 and 6.1 reciprocal cm with monodisperse 0.500, 1.099, and 1.947 millimicron diameter aerosols. Efficiencies were between 80-90% and sample collection was only slightly biased with respect to particle size. The instrument was also evaluated for uniformity of aerosol deposition on several types of collecting surfaces. Deposition was uniform on glass microscope slides but not on Millipore filters. Deposition on the coated side of electron microscope grids was equal to deposition on the glass slides but was one-half less on the uncoated side. This discrepancy is tentatively attributed to preferential deposition on the grid wires. (Author abstract modified)

10685 APTIC NO. 28798

Sievering, Herman C., Richard G. Semonin, and Raj Mittra

LASER RADAR COHERENCE CONSIDERATIONS.

J. Opt. Soc. Am., 59(12):1679-1680, Dec. 1969. 6 refs.

The use of laser radar for Doppler-shift measurements demands coherent detection of the backscattered signal. Conditions under which return signals from a Q-switched ruby-laser radar will be coherent are distinguished from conditions giving rise to incoherent signals. The determination of detector-aperture radius for coherent and incoherent detection is discussed in relationship to changes of the coherence length of the transmitted signal.

AIR QUALITY MEASUREMENTS

10686 APTIC NO. 27885

Takahashi, Masanao and Kiyohiko Hirafune

STUDIES ON ATMOSPHERIC POLLUTION IN IWATE PREFECTURE. NO. 10. STATISTICAL OBSERVATIONS ON THE SETTLING DUSTS IN IWATE PREFECTURE. (Iwate-ken no kogai ni kansuru kenkyu. Dai-10-po. Iwate-ken ni okeru kokabaijinryo no tokeiteki kosatsu). Text in Japanese. Iwate-Ken Eisei Kenkyusho Nenpo (Ann. Rept. Iwate Inst. Public Health), no. 12:100-106, 1968. 2 refs.

The total amount of settling dusts in Iwate Prefecture was treated statistically. Based on the area average and the confidence level, the intensity of pollution due to settling dusts can be ranked in the descending order of Higashiyama, Kamaishi, Ofunato, Kuni, and Morioka. The highest values recorded in the polluted districts of the above cities averaged around 40 g/cu m/30 days, and the worst recorded pollution was the average of 97.7 g/ cu m/30 days in Matsubara Area of Kamaishi in 1962. The t-test values according to areas were such that in Matsubara Area, the values decreased from 1962 to 1964, and tended to increase in 1965. In Owatari Area of Kamaishi, there was an increase from 1964 to 1965, and in Kuni, Yamada Area showed decreasing t-test values from 1963-1964. In Higashiyama, Nishimoto Area showed a decrease from 1963 to 1964, but in other areas the values were less than 2.1 at five percent level of significance. The minor differences in the average annual values are considered to be attributable to simple sampling errors.

10687 APTIC NO. 27886

Tsutai, Sakae and Tsuyoshi Sato

MEASUREMENT OF SULFUR OXIDES CONCENTRATION IN THE CITY OF AKITA BY LEAD PEROXIDE CANDLE METHOD.

(Nisankanamariho ni yoru Akita-shi taikichu iosankabutsunodo no sokutei). Text in Japanese. Akita Kogyo Koto Senmon gakko Kenkyu Kiyo (Res. Repts. Akita Tech. Coll.) no. 5:76-84, Jan. 1970. 9 refs.

The British DSIR lead peroxide candle method, considered the most appropriate for measuring sulfur oxides in ambient air according to areas and seasons over a long period of time, was used at 18 locations of Akita beginning in November 1967 and continuing to September 1969. Air pollution by sulfur oxides in Akita is quite light except for some sections, and differences exist between various districts. Concentrations vary according to seasons. According to Wilsdon's formula, the conversion of lead peroxide measurement values (mg SO_3/day/100 sq cm PbO_2) into ppm yielded average values at the locations ranging from 0.002 to 0.035 ppm, which is much lower than the recently established Environmental Standard for Sulfur Dioxide. However, in the industrial area, values surpassing the standard values were observed six times.

10688 APTIC NO. 27944

Neligan, Robert E.

HYDROCARBONS IN THE LOS ANGELES ATMOSPHERE.

Arch. Environ. Health, vol. 5:581-591, Dec. 1962. 6 refs. (Presented at the session on Constituents of Motor Vehicle Exhaust at the Air Pollution Research Conferences, Los Angeles, Calif., Dec. 5, 1961.)

Sixteen ambient air samples from the central Los Angeles business district were analyzed by gas chromatography to identify hydrocarbons in the C2-C7 molecular weight range and to determine their concentrations. The relative concentrations of the individua hydrocarbon groups did not change significantly with total concentration, indicating that the hydrocarbon emissions to the atmosphere are relatively constant. A linear relationship existed between total hydrocarbons recovered and the sum of the nitric oxide-nitrogen dioxide levels. The results were compared with data for diluted automobile exhaust and diluted exhaust that had been irradiated for 4 hrs. Natural gas could be a major source of the low-boiling hydrocarbons present in the atmosphere. The relatively low acetylenic level found in the ambient air samples, compared to diluted automobile exhaust, also indicates that significant contributions are made by automobile blowby emissions as well as carburetor and fuel tank evaporation losses. The analytical method described was an accurate reproducible procedure for analysis of C3 to C7 hydrocarbons in the atmosphere, but was limited by the inability to determine the methane concentration as well as the C8 hydrocarbons. (Author conclusions modified)

10689 APTIC NO. 27983

Brief, Richard S. and Robert G. Confer

AIR QUALITY MONITORING: PROCEDURES, DATA ANALYSIS.

Heating Piping Air Conditioning, 43(3):121-128, March 1971. 13 refs.

Whether local, state, or federal air pollution control goals are being achieved can only be determined by reliable measurements of the contaminants in the air over long periods of time. In January 1968, the Medical Research Div. of Esso Research and Engineering Co., in conjunction with other divisions of the company, decided to establish, on a modest scale initially, an air monitoring facility to be known as the Esso Research Air Monitoring Station, or ERAMS. The equipment in use includes a conducttivity analyzer for sulfur dioxide, an optical device for particulates, an ozone meter, sulfation candles and a dustfall bucket, wind speed and direction recorders, an infrared analyzer for carbon monoxide, a colorimetric analyzer for nitrogen dioxide, high volume particulate samplers, a flame ionization detector for hydrocarbons, and a piezoelectric quartz crystal detector for hydrocarbons. Data collected at ERMAS are evaluated for each hour sampled; one exception is smokeshade data, for which a 2 hr sampling period is used. SO2 levels and rate of sulfation are discussed. Even though lower levels of sulfur in heavy fuel oils and coal were encountered sequentially during 1968 and 1969, the fact that westerly wind directions predominated resulted in essentially unchanged average concentrations of SO2 from the residential sources west of ERAMS. SO2 measurement methods are compared. Public relations hav improved because complaints about pollution from local company facilities can now be fairly well appraised based on prevailing wind speed and direction information available at ERAMS.

10690 APTIC NO. 28097

Schedling, J. A.

THE MEASURING AND ANALYSIS OF ATMOSPHERIC POLLUTION.

(Ueber Messungen und Analysen von Luftverunreinigungen). Text in German. Arch. Hyg., 154(4):349-357, 1970. 5 refs.

The tendency prevails not to limit the measuring of atmospheric pollution to the determination of a single pollutant like to sulfur dioxide because the assumption that the level of an indicato substance is a characteristic measure of the sum of all pollutants is valid only to a limited extent, if at all. Five hundred dust fall measurements performed over a period of two years (1962-1963) in a center city site in Vienna and 2000 dust fall measurements performed in 1965 and 1966 and continued at the same site in 1969 by means of a dust collection filter device at 1 and 9 m above ground were evaluated and the levels of lead, of benzopyrene and of fluorine compounds were determined. Lead compounds were determined polarographically; benzopyrene, spectrometrically; and fluorine compounds, by means of an ion-sensitive electrode. The present air pollution monitoring program in the city of Vienna will have to be extended to include nitrogen oxides and hydrocarbons and later also asbestos dust and oxidants. The pollution levels will have to be evaluated on the basis of internationally agreed air quality criteria not only for their immediate toxicity but for their hygienic implications in the overall pollution picture as seen by the WHO.

10691 APTIC NO. 28133

Himi, Yasuji, Osami Mori, Hideo Tanaka, and Tomio Muramatsu

AIR POLLUTION DUE TO DUST ANN SMOKE IN KEIHIN INDUSTRIAL AREA. (REPORT 18).

(Baijin ni yoru Keihin kogyochitai no taiki osen. Dai-18-po. Keihin kogyo chitai to sono shuhen chiiki ni okeru koka baijinchu no jukinzoku). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):209, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 10th, 1970.)

Settling dusts in the Keihin industrial area and its environs, were examined for their heavy metal content in an attempt to define air pollution in an industrial city. Dusts were collected by deposit gauge between February 1967 and January 1968. The settling dusts were then treated with acid mixtures and analyzed by absorption spectrophotometry for titanium, vanadium, chromium, manganese, iron, and nickel tabulation of the results shows that the settling quantities of each element declines with distance from the industrial area. A mathematical relationship was derived that shows the settling quantity (kg/sq km-month) as being inversely proportional to the lth (some constant number) power of the distance from the center of the industrial area. The formula and the data showed that a large quantity of heavy metals are falling in the industrial area.

10692 APTIC NO. 28134

Kohgo, Tettaro, Ryosaku Endo, M. Kamada, Tatsunori Oyake, and Hiroshi Shirakawa

AIR POLLUTION OF SAPPORO. PART V. AIR POLLUTION REPORT OF NATIONAL AIR POLLUTION SAMPLING NETWORK (1969).

(Sapporo no taiki osen. Dai-5-ho. Kokusetsu Sapporo sokuteisho sokuteikekka. 44-nen-do). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):205, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 10th, 1970.)

Air pollution measurements recorded in Sapporo during 1969 are summarized. Monthly and daily average concentrations were high in January, reaching 4.3 and 8.7 pphm respectively. At 23.6 pphm, the hourly average value was the highest in March. The number of hours for which the hourly average value was below 20 pphm was 99.9% of the total number of hours, but 99% in January. For nitrogen dioxide, the annual average was 3.1 pphm; monthly and daily averages were highest in April. For suspended dusts, the yearly average was 0.07 mg/cu m; monthly and daily averages were highest in January at 0.17 mg/cu m. The comparison of 1969 data with 1968 data showed that the values were generally lower in 1969, especially in February. The cause is apparently meteorological conditions such as wind speed, since there was no decrease in the emission sources. In general, air pollution in Sapporo was high in winter and low in summer. Pollution in January was especially high, due mainly to domestic and business heating and automobile exhaust gas and the influence of wind velocity.

10693 APTIC NO. 28135

Nakano, Michio, Noboru Nakatsuji, G. Ueda, and Kimiko Fujie

SULFUR OXIDES CONCENTRATION IN OSAKA CITY (NO. 1).

(Osaka-shi ni okeru iosankabutsu nodo. Sono-l). Taiki Osen kenkyu (J. Japan Soc. Air Pollution), 5(1):195, 1970. Text in Japanese. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 10th, 1970.)

Sulfur oxides were measured in Osaka by the PbO2 method at 161 stations each marked on a 1 sq km grid. Taking into consideration the distribution pattern of average concentrations and the characteristics of each area, the grids were organized into blocks. The correlation between the blocks was then studied. The data employed were obtained between May 1967 and Marc 1970. Based on the data, isoquants were drawn for the sulfur oxides concentration, and correlations were found between the amoun of smoke emitted and the average sulfur oxides concentrations in th areas defined by the isoquants. There was also a correlation between the blocks based on the isoquants and commercial, coastal, and southern districts, especially inland.

10694 APTIC NO. 28178

Resch, W.

THE LEAD CONCENTRATION BEFORE A TRAFFIC LIGHT OF AN INTERSECTION.

(Ueber die Bleikonzentration in Stauraum einer Kreuzung). Text in German. Arch. Hyg., 154(4):367-370, 1970. 7 refs.

The emission levels of solid lead compounds in a street in center city Vienna were determined by polarographic determination of 639 filters exposed for three hours each to the atmosphere polluted by heavy traffic. The mean value of all tests was 2.5 micron/cu m; the peak value measured, between 12.00 and 15.00 hours on a Monday was 14 micron/cu m; and the lowest value was 0.2 micron/cu m on a Wednesday between 0.00 and 3.00 hours at night An analysis of the concentration values revealed that 68% of them did not exceed 3 micron/cu m. Four three hour periods were recorded when the concentration exceeded 10 micron/cu m. The correlation between lead concentration and traffic is obvious. The order of magnitude of the lead pollution levels recorded in Vienna are comparable with those recorded in German, French, Italian, and American cities.

10695 APTIC NO. 28179

Seiller, W.

CONTINUOUS MONITORING OF SULFUR DIOXIDE LEVELS IN THE VIENNA AREA.

(Kontinuierliche SO2-Messungen im Raum von Wien). Text in German. Arch Hyg., 154(4):358-362, 1970. 4 refs.

The sulfur dioxide levels at three measuring points of center city Vienna were determined by means of gas analyzers working on the conductivity principle and the monthly mean values, the relative frequency distribution of the half hour mean values and th daily rhythm of pollution levels were recorded. Highest pollution levels occurred in December which coincided with peak house heating activity. February levels were conspicuously low which was due to a special meteorological constellation. There were clear differences between concentrations recorded at the 3 stations In station 1, 76 half hour mean values exceeded 0.4 mg/cu m; in station 2, 11; and in station 3, 193. The highest emission level recorded was 0.5092 mg/cu m. A significant difference was found between SO2 levels recorded during the three daily 8 hour periods (from 6 to 14, from 14 to 22, from 22 to 6 hours). No difference was found between pollution levels on the various days of the week. In all 3 sites SO2 pollution levels decreased with increasin wind velocity irrespective of direction.

10696 APTIC NO. 28183

Hauck, H.

CO-MEASUREMENTS BEFORE THE TRAFFIC LIGHT OF AN INTERSECTION.

(CO-Messungen im Stauraum einer Kreuzung). Text in German. Arch. Hyg., 154(4):363-366, 1970. 4 refs.

A preliminary report on the findings of carbon monoxide concentration measurements performed from October 1969 till March 1970 before the traffic light of an intersection in center city Vienna 1 and 10 m above ground disclosed a good correlation between the daily pattern of half hour CO mean values and traffic frequency for all days of the week. A classification of the values found into categories differing from each other by 10 ppm revealed that of the 7071 measurements, 60.8% fluctuated betwee 0 and 10 ppm CO; 27.8%, between 11 and 20 ppm CO; 8.9%, between 21 and 30%; 2.5% between 31 and 40 ppm CO; 0.3%, between 41 and 50 ppm; and only 4 exceeded the maximum permissible level of 50 ppm. Conspicuous is the high correlation between the daily mean CO level and the half hour CO mean value of the same day. The mean ratio of CO concentrations at 1 and 10 m above ground determined simultaneously by 2 URAS instruments was 1.67:1.

10697 APTIC NO. 28188

Huffstutler, K. K.

FLUORIDE CONCENTRATIONS IN VARIOUS RECEPTORS NEAR PHOSPHATE INDUSTRIES.

Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 17p., 1970. (Presented at the Air Pollution Control Association, Annual Meeting, 63rd, St. Louis, Mo., June 14-18, 1970, Paper 70-153.)

Within Polk, Hillsborough, and Manatee Counties in west central Florida are located 17 phosphate fertilizer and related phosphate product manufacturing plants, 13 of them enclosed within seven and a half mile radius in Polk County. In 1965 an emission limit regulation was adopted limiting each company to 0.6 lb fluoride per ton of P2O5 manufactured in any one 24-hr period prior to May 1, 1964, allowing one year for compliance. Total industry emissions dropped from 11,700 lb per day in 1965 to 2700 lb in 1969. Samplin data show a related decrease in ground level concentrations. On the basis of data collected in a pasture grass sampling program started in 1963, a 40 or 45 ppm 'iso-fluor' was drawn representing the average annual at each station, in order to measure affected areas and to define land ownership and use patterns. Measurements of fluoride accumulation in citrus leaves did not demonstrate correlation with ambient air fluoride levels; however, in a preliminary test of root uptake of fluoride, a citrus tree receiving gyp pond water showed an increase in fluoride content double that of a control tree.

10698 APTIC NO. 28233

Endo, Ryosaku, Tetsutaro Kohgo, Naoki Sugawara, Yutaka Matsumoto, and Tatsunori Oyake

STUDIES ON URBAN AIR POLLUTION BY AUTO EXHAUST IN HOKKAIDO (PART 4): RESULTS OF SURVEY IN TOMAKOMAI CITY.

(Hokkaido no toshi no okeru jidosha haishutsu gasu no taikiosen ni tsuite (dai 4 po) Tomakomaishi ni okeru chosa kekka ni tsuite). Text in Japanese. Hokkaidoritsu Eisei Kenkyusho-ho, vol. 19:197-201, 1969. 6 refs.

Concentrations of airborne dust, carbon monoxide, nitric oxide, nitrogen dioxide, lead, and 3,4-benzopyrene were monitored, together with the number of vehicles passing by, at two roadside locations in Tomakomai. One observation point (A) was located in front of the railroad station, the other (B) at the intersection of the national highway. Traffic was heavier, the road wider, and the wind stronger at point B. With the exception of dust, measured pollutant values were a little higher at A. Respective maximum concentrations of dust, carbon monoxide, sulfur dioxide, an nitrogen oxides (NO plus NO2) were 295 microgram/cu m, 16.6 ppm, 0.096 ppm, and 0.278 ppm. Concentrations of lead and 3,4-benzopyrene were 0.26-0.90 microgram/cu m and 3.23-17.30 microgram/1000 cu m, respectively. In comparison with other cities in Hokkaido having equally heavy traffic, air pollution by auto exhaust is concluded to be low in Tomakomai. The sulfur dioxide values recorded are attributed to the fact that buildings are less dense in the city.

10699 APTIC NO. 28325

Murata, Motohiko, Hiroshisa Shima, T. Matsui, Hiroshi Hirobe, Tsuyoshi Kanamaru, and Kuniaki Naka

AIR POLLUTION IN YOKKAICHI CITY. PART III. ON SULFUR OXIDES IN SUSPENDED DUSTS.

(Yokkaichi no taiki osen. Dai-3-po. Fuyufunjinchu no iosankabutsu nitsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):199, 1970. 2 refs. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 10th, 1970.)

Sulfur oxides in suspended dusts were measured in the Shiohama district of Yokkaichi where petrochemical industries are a source of air pollution. Air was sampled by a high-volume air sampler for 24 hours, collected on glass-fiber filters, and analyzed. The amount of sulfuric acid in the sulfate ion was measured by the Commins method. In addition, sulfur oxides were collected in a special saltwater solution, and 24-hour average concentrations of sulfur dioxide and the sulfate ion were calculated by Watanabe's method. Except for one location, sulfuric acid in the sulfate ion was about 30%. The sulfuric acid-sulfate ion ratio was in percentage multiplied to the sulfate ion value obtained from the saltwater collection, and correlated with the sulfate ion value. A correlation at 1% significance level as found for two locations.

10700 APTIC NO. 28326

Murata, Motohide, Hiroshisa Shima, T. Matsui, Hiroshi Hirobe, Tsuyoshi Kanamaru, and Kuniaki Naka

AIR POLLUTION IN YOKKAICHI CITY. PART II. RESULT OF INVESTIGATION OF SUSPENDED DUSTS.

(Yokkaichi no taiki osen. Dai-2-ho. Fufyufunjin no chosakekka ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):198, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 10th, 1970.)

Suspended dusts in Yokkaichi were analyzed for metallic elements and their general distribution. Items studied were average, maximum, and minimum values (micrograms/cu m) of total suspended dust, the sulfate ion, the nitrate ion, iron, manganese, lead, copper, titanium, vanadium, and phosphorus. The nitrate ion was not found in sufficient quantity to be of concern. The nitrate ion was not found in sufficient quantity to be of concern. Lead averaged 0.4 micrograms/cu m in the area of heaviest traffic volume. Phosphorus had only one emission source and was convenient for observing distribution. In general, concentration decreased with distance from the source. The sulfate ion and vanadium had a similar distribution, and both were relatively high in one location, the vicinity of a petrochemical complex.

10701 APTIC NO. 28327

Nakano, Michio, Yasuhiro Hayashi, and Hiroshi Takeuchi

SULFUR OXIDES CONCENTRATION IN OSAKA CITY. NO. 2.

(Osaka-shi ni okeru iosankabutsu nodo. Sono-2). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):196, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 10th, 1970.)

Data on sulfur dioxide, suspended dusts, and wind speed and direction were collected at 12 monitoring stations in Osaka and then centrally processed by an anlog-telemeter system. Based on the data, the annual variation in sulfur dioxide concentration and areal characteristics were analyzed. By drawing a frequency distribution diagram for sulfur dioxide, the areal characteristics could be observed in the form of graphs. Seasonal and areal characteristics of sulfur dioxide concentration were obtained by relating the average concentrations from the monitoring stations and the wind directions for summer and winter recorded at 165-m altitude of Osaka Tower. Furthermore, relationships were also obtained between the wind speeds and sulfur dioxide concentrations recorded at the monitoring stations.

10702 APTIC NO. 28329

Kohgo, Tettaro, M. Kamada, Ryosaku Endo, and Tatsunori Oyake

AIR POLLUTION OF SAPPORO. PART IV. STATISTICAL ANALYSIS FOR MECHANISM OF AIR POLLUTION.

(Sapporo no taiki osen. Dai-4-po. Osenkiko no tokei teki kaiseki). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):204, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 10th, 1970.)

Statistical analyses were made of data obtained at the National Air Pollution Sampling Network station in Sapporo between July 1968 and March 1969. In summer, the sulfur dioxide concentration was low. From September to November, am and pm, peaks began to appear; from December to February, the concentration peaks became very conspicuous, especially around 9 am, commensurate with the domestic heating activities. In general, spring and summer showed a similar pattern of frequency of pollutio as did autumn and winter. Sulfur dioxide concentrations became very high when the air was calm, whether day or night, and when the wind was easterly. Even when pollution was of the metropolitan type, high-concentration pollution occurred downwind when wind velocity, was high.

10703 APTIC NO. 28330

Miyamoto, I., Kazuko Terai, Gunji Kawasaki, Yutaka Miyanishi, and M. Yamazaki

AIR POLLUTION IN IWASE, YOSHIHISA, AND FUSHIKI TOYAMA PREF.

(Toyama-ken Iwase, Yoshihisa, Fushiki no taiki osen jokyo ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):203, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 10th, 1970.)

Settling dusts were measured by dust jars, sulfur oxides by the PbO2 method, and suspended dusts by low-volume air samplers in the Iwase, Yoshihisa, and Fushiki areas of Toyama Prefecture. These areas form a complex of plants, some with electric furnaces, in an upwind position. The results of the measurements are tabulated and the geographical distribution of concentrations is indicated. In general, air pollution in the investigated areas is higher than in the rest of the prefecture.

10704 APTIC NO. 28331

Suzuki, Kozo

RESEARCH ON ACTUAL CONDITIONS OF PUBLIC NUISANCE AND ITS CONTROL IN AOMORI PREF. PART III.

(Hachinoche chiku ni okeru taiki osen to kokumin kenko hoken shinryo kado no chosa ni yoru shippei rakanritsu tono kanren ni kansuru kosatsu. Aomoriken ni okeru kogai no jittai to taisaku ni kansuru chosakenkyu. Dai-3-po). Text in Japanese. Taiki Osen Kenkhu (J. Japan Soc. Air Pollution), 5(1):207, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 10th, 1970.)

A relationship is shown between air pollution data obtained in Hachinoke in 1968 and 1969 and the results of a morbidity study (of air pollution-related illnesses) based on national health insurance data. The number of cases of laryngeal and pharyngeal tonsilitis, chronic bronchitis, bronchial asthma, emphysema, lung infections, lung cancer, circulatory illnesses, eye affliction, and allergic dermatitis are tabulated for Shirogane, Minato, Konakano, and Kashiwazaki. The number of patients whose health insurance records were investigated numbered 80,000.

10705 APTIC NO. 28369

Kettner, H., R. Langmann, and W. Maassen

DEPOSITION OF LEAD FROM THE ATMOSPHERE.

(Die Bleideposition aus de atmosphaerisichen Luft). Text in German. Fortschr. Med., 89(5):179-180, 202, 1971. 23 refs.

The lead content in the blood of Americans has for 3 decades fluctuated between 10 and 4 micron Pb in 100 g blood without an appreciable increase. The harmfulness of lead can be demonostrated only when certain levels of lead in the atmosphere can be identified with certain symptoms of the organism as outlined by the WHO guidelines by a 4-step procedure. Lead deposit data are few. In 32 American cities, median daily lead fall was 0.5 mg/sq m/day. At a distance of 8 miles from a turnpike, the daily lead deposit was 0.36 mg/sq m/day and in its vicinity, 1.4 mg/sq m/day. The share of lead in dust deposits in the German cities of Wuppertal was 0.165; in Neuss/Rh, 0.22; in Duesseldorf, 0.31; in Muehlheim/Ruhr, 0.558; and in Duisburg, 4.83 mg/sq m/day (1965). Irrespective of the difference of opinion about the harmfulness of lead in the atmosphere, its presence in the air is in principle undesirable. By October 1975, all gasolines manufactured in the USA will be lead-free. Other trace elements in the atmosphere that should be controlled include vanadium, copper, zinc, manganese, cobalt, and nickel.

10706 APTIC NO. 28398

Iki, Sadao

AIR POLLUTION IN KITAKYUSHU CITY. STATUS IN THE LATEST ONE YEAR PERIOD.

(Kitakyushushi no taiki osen - saikin 1 kanen no jokyo -) Text in Japanese. Kyushu Sangyo Daigaku Kogakubu Kenkyu Hokoku (Kyushu Ind. Coll. Res. Rept.), no. 3:9-20, March 1966.

A survey of atmospheric deposits and sulfur dioxide in Kitakyushu City, was conducted by the Kitakyushu Air Pollution Inquiry Association from June 1964 to May 1965. Ten monitoring stations were chosen from each of the industrial, commercial, and residentia districts in an effort to obtain the most reasonable average possible. The atmospheric deposits were monitored by deposit gauge and sulfur dioxide by the PbO2 method. The amount of atmospheric deposits was decreasing year after year at a rate of about 5% for the present period. The amount of SO2, on the other hand, was increasing at a rate for the present period of 4%. The amount of tar in the atmospheric deposit was decreasing year after year at a rate for the present period of about 18%, which was larger than the rate of decrease of the atmospheric deposit. The decrease in atmospheric deposits and increase in sulfur dioxide reflects the same trend noted in the preceding 5 years. Sulfur dioxide is expected to increase in the future and is considered to be the most serious problem. The extremely large decrease in tar is presumed to reflect not only the greater use of dust collecting equipment but also the gradual improvement in heat management and combustion techniques.

10707 APTIC NO. 28403

Iki, Sadao, Gijiro Hosokawa, and Akiko Kage

AIR POLLUTION IN KITAKYUSHU CITY (IV).

(Kitakyushushi no taiki osen chosa dai 4 po). Text in Japanese. Kyushu Kogyo Daigaku Kenkyu Hokoku, Kogaku (Bull. Kyushu Inst. Tech., Eng.), no. 15:85-100, March 1965. 6 refs.

Atmospheric deposits and sulfur dioxide in Kitakyushu City were investigated by the Kitakyushu Air Pollution Inquiry Association between June 1959 and May 1964. Results are reported for the last year, i.e., the period from June 1963 to May 1964. Deposit gauges and PbO2 candles were installed at 53 locations in industrial, commercial, and residential districts of the city. Samples were collected and measured monthly. The results indicate a continuing decrease in the amount of atmospheric deposit and that of tar contained therein, but a gradual increase in SO2. The percentage of the soluble matter in the total atmospheric deposit increased, though the total deposit decreased. The amount of ferric oxide in the atmospheric deposit, caused by the so-called red smoke, was not as large as estimated from its external appearance. Industrial areas scored highest in atmospheric deposits as well as sulfur dioxide, followed by commercial and residential areas. No seasonal change was observed either in atmospheric deposits or in sulfur dioxide. The same was true with the tar content in the deposits. Cooperation among engineering, meteorological, hygienic, agricultural, and forestry specialists is concluded to be important for the control of air pollution, as is a master plan for future city development.

10708 APTIC NO. 28528

Kawase, Yoshikazu, Taku Kitano, Seiichiro Yuge, and Seiichiro Ito

MEASURING METHODS AND RESULTS OF LEAD OF AUTOMOBILE EXHAUST GAS.

(Jidosha haigasuchu no namari no sokuteiho to kekka ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):255, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 10th, 1970.)

Lead concentrations were measured at five high-volume traffic intersections in Saitama and at distances of 10 and 100 m from each intersection. Measurements were taken four times a day at different time periods. Three methods were used: sampling by a high-volume air sampler and analysis by atomic absorption spectrophotometry; sampling by midget impinger and analysis by atomic absorption spectrophotometry; and air-induction through a 5-cm polyethylene filter, then absorption by a gas-absorption tube, and analysis by atomic absorption spectrophotometry. The lead concentration was highest with filter and absorption tube together and lowest with the absorption tube alone. Various data are given for different locations at different time intervals, together with the carbon monoxide concentrations.

10709 APTIC NO. 28602

Borisyuk, Yu. P., and B. S. Ruchkovskiy

BENZO(A)PYRENE POLLUTION OF THE ATMOSPHERE NEAR CERTAIN INDUSTRIAL INSTALLATIONS.

(Zagryazneniye 3,4-benzpirenom atmosfernogo vozdukha v rayonakh nekotorykh proizvodstvennykh predpriyatiy). Text in Russian. Gigiena i Sanit., vol. 30:93-94, Jan. 1965. 4 refs.

Results of fluorescent spectrographic and spectrophotometric studie of samples taken with 2000-cu m aspiration probes (using an FPP-15 filter) are presented. Benzo(a)pyrene was detected at four (three asphalt-concrete plants and one metallurgy combine) out of six industrial sites in concentrations of 15-60 microgams per 1000 cu m of air.

10710 APTIC NO. 28607

Iguchi, S., Raisaku, Kiyoura, T. Kuramoto, M. Munidasa, and Y. Uenishi

CORRELATIONS OF POLLUTION AMBIENT AIR OF INDUSTRIAL COMPLEXES AND URBAN AREAS.

(Konbinato nado ni okeru taiki osenshitsu sogo no kankei). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):231, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

Air pollution was measured in Yokkaichi, Amagasaki, Kawasaki, and Tokyo, taking into consideration the differences in the nature of air pollution in each city. Sulfur dioxide was determined by the pararosaniline method and an electroconductivity automatic recorder. For the atmospheric acidity measurements, air was induced by an ipinger at the rate of 30 l/min into hydrogen peroxide solution. Titration was performed by a caustic soda standard solution to obtain 'total acid'. The hydrogen peroxide solution was also analyzed for ammonium and sulfuric acid ions. Suspended particulates were collected by a high-volume air sampler and a cascade impactor. Considerable deviations exist between cities. In Yokkaichi, sulfur dioxide exceeded total acid in contrast to other cities.

10711 APTIC NO. 28608

Nogami, Junji, Masayoshi Izumikawa, and Shigeo Nakagishi

CARBON MONOXIDE EXHAUSTED FROM MOTOR VEHICLE.

(Jidosha haiki ni yoru CO osen no jittai ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):237, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

Carbon monoxide levels at main traffic intersections in Osaka Prefecture were measured at points two meters above the edge of the road. In addition, sulfur dioxide and suspended particulates and meteorological variables were measured. The intersections that did not qualify under the new environmental standard were Izumi-Otsu station, Kushin-cho, Hanazono-cho, and Nanba station. Another set of measurements was conducted at Umeda station along Highway 1 to determine the horizontal and vertical distributions of carbon monoxide. Concentration decreased with horizontal distance from the source and with altitude, apparently due to the wind direction. Therefore, the side of the road was found to be appropriate for measuring concentrations for the environmental standard. A regression line relating concentration to hourly traffic volume was derived, with r equals 0.92.

10712 APTIC NO. 28612

Shigenobu, Minoru, Jiro Kondo, and Susumu Kotake

ESTIMATION OF AUTO EXHAUST DISTRIBUTION AT INTERSECTIONS.

(Kosaten ni okeru jidosha haishutsu gasuryo bunpu no suitei). Text in Japanese. Preprint, Japan Society of Mechanical Engineering, Tokyo, 4p., 1971. 2 refs. (Presented at the Japan Society of Mechanical Engineering, Annual Meeting, 48th, Chiba, Japan, April 2-6, 1971, Paper 1004.)

The driving pattern of automobiles approaching a traffic intersection was assumed to consist of constant speed, deceleration stop, and acceleration. Deceleration was considered to be uniform, with the rate decreasing toward the end of a row of incoming vehicles. Acceleration was expressed in an exponential form. The pattern was classified into five categories: to stop once for a red light, to change from deceleration to acceleration with a change of the light from red to green, to pass through at a constant speed on green light, to stop twice because of a change of the light to red during starting, and to wait for several changes of the light because of congested traffic. Calculated values were compared with those observed at the Nihonbashi intersection in Tokyo. The traffic flow was recorded by the use of a memo-motion camera. Carbon monoxide in the exhaust of Japanese gasoline engine automobiles was monitored at constant speed cruising, deceleration, stop, and acceleration. By combining the driving model and the exhaust characteristics, the amount of CO along the unit length of the street was calculated. The result showed the same number of peaks in the CO emission as the number of incoming automobiles; the height of the peaks decreased toward the end of the row of incoming automobiles. Effects of atmospheric diffusion and wind velocity were neglected in the study.

10713 **APTIC NO. 28617**

Ukai, Haruo, Kuniro Uno, Y. Ose, Keiko Sasaki, and M. Kiriyama

STUDIES ON AUTO-EXHAUST GAS POLLUTION IN GIFU-CITY.

(Gifu-shi ni okeru jidosha haigasu no jittaichosa). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):245, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

Among Japanese prefectures, Gifu Prefecture ranks second in terms of per capita number of automobiles. From 1966 to 1969, various meteorological factors plus traffic volume, carbon monoxide, sulfur dioxide, nitrogen dioxide, suspended dusts, and noise were measured at busy traffic intersections in the city of Gifu to assess the nuisances produced. Hourly traffic volume was 1000-3000 cars, which at times reached 5500. Carbon monoxide averaged 4-21 ppm from 7 am to 7 pm, but sometimes reached 37 ppm; there were peaks between 8-10 am and at 4 pm. Average SO2 levels between 7 am to 6 pm sometimes exceeded 0.05 ppm. The maximum value observed was 0.102 ppm. Of 59 NO2 measurements, 49 showed concentrations over 0.05 ppm. For dusts, there were peaks at 8-10 am and after 4 pm. The average of the median value for noise was 68-85 phons between 7 am and 7 pm.

10714 **APTIC NO. 28618**

Yamate, Noboru and Toshiro Matsumura

SUMMARY OF CARBON MONOXIDE LEVELS DURING THE PAST SIX YEARS (1964-1969) AT THREE AIR MONITORING STATIONS IN TOKYO.

(Saikin rokunenkan (1964-1969) no Tokyo-tonai sanchiten no issankatanso nodo ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):242, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

Infrared analysis measurements of carbon monoxide concentrations at three locations in Tokyo (Kasumigaseki, Itabashi, and Shinjuku) from 1964 to 1969 were analyzed. The number of hourly average values obtained during the six years was 119,482. The average value was 4.9 ppm, with an hourly maximum value of 50 ppm. The daily average value maximum was 19.3 ppm, and the maximum for the monthly average was 11.0 ppm. The diurnal variation of the concentration showed that for all three locations, the lowest value is at around 5 am; after that, for Kasumigaseki and Itabashi, a peak appears in the morning and in the evening. For Shinjuku (Oharacho), there is a peak at 7 pm. Other more detailed weekly and monthly findings are presented.

10715 **APTIC NO. 28619**

Endo, Ryosaku, Tettaro Kohgo, Hiroshi Shirakawa, and Tatsunori Oyake

STUDIES OF THE URBAN ATMOSPHERIC POLLUTION BY AUTOMOBILE EXHAUST GAS IN CITIES OF HOKKAIDO. (PART III): ON THE MEASUREMENT OF CARBON MONOXIDE AND TOTAL HYDROCARBON BY AUTOMATIC CONTINUOUS APPARATUSES.

(Hokkaido no toshi ni okeru jidosha haishutsu gasu no taiki osen ni tsuite. Dai-3-po. Jido sokutei kirokushochi ni yoru issankatanso oyobi tankasuiso no chosani tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1): 240, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

Carbon monoxide and total hydrocarbon concentrations (CTO) were measured along the main Hokkaido highways in the summer of 1969. Carbon monoxide was measured with a nondispersive infrared analyzer and hydrocarbons (propane-conversion values) measured with a hydrogen flame ionization detector. Both CO and THC daily averages and hourly values were high in Hanazono and Otaru. The values at Asahikawa and Sapporo were approximately half of the Otaru values. The diurnal records show that concentrations are high in the daytime and low at night. For those locations where hourly averages of both CO and THC were measured, correlations are presented in a table. The correlation coefficient was r equals 0.94 (n equals 129), and the regression equations are presented. The cause of the high concentrations in Otaru is apparently due to the fact that traffic volume is very high and the road narrow.

10716 **APTIC NO. 28620**

Ito, Eiichi, Kiyoshi Kubo, Kazunori Kamakura, Akio Wada, and Juji Takeuchi

ON AIR POLLUTION BY LEAD FROM VEHICLE EXHAUST.

(Jidosha no haishutsu gasu ni yoru namari osen ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):254, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

Atmospheric lead concentrations were measured in Nagoya. Samples were taken at busy traffic intersections with a high-volume air sampler, and analysis was done by atomic absorption spectrophotometry and polarography. The average lead concentration was 2.4 micrograms/cu m. An average of 5.4 micrograms/cu m was the highest among the daily averages at ten locations. Concentrations were usually highest in the morning and in the evening. The amount of lead in suspended particulates varied, expecially according to the weather, but the average lead content was about 0.7%. On rainy days the content was as high as 2% at some locations. Lead concentrations decreased with distance from the road, but on rainy days the decrease with distance was not significant. When determining lead by atomic absorption spectrophotometry, the interference by sodium was very significant, as has been reported in other studies. It is necessary to establish accurate correction values for sodium.

10717 **APTIC NO. 28622**

Asakuno, Kunihiko, Yukio Inokushi, Tatsuo Yamamoto, Yoshiharu Shinozaki, and T. Odaira

STUDIES ON SIZE SPECTRA OF PARTICULATE POLLUTANTS.

(Ryushijo osenbusshitsu no ryukei patan ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):212, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

Two-stage cascade impactors and activation analysis were used to measure the suspended particulate size distribution and diffusion phenomena, specifically the geographical differences and the three-dimensional variation. Samples were collected on the Mylar membrane, and the particles which passed through the cascade were collected by means of a millipore filter (0.8 micron). Activation was conducted at a nuclear reactor experiment station, and gamma-radiation spectra were analyzed by Ge(Li) detector. The data were processed by an electronic computer. The particulates detectable by the activation analysis were sodium, aluminum, chlorine, vanadium, manganese, bromine, scandium, iron, cobalt, nickel, zinc, lanthanum, potassium, indium, and tin. Many of these apparently did not originate from industrial processes, but from the earth's crust. The particle sizes varied according to the elements, and those substances that are thought to originate from artificial processes were more prevalent in smaller regions. The results of measurements at Setagaya, Ota, and Yurakucho of Tokyo are presented.

10718 **APTIC NO. 28624**

Kiyoura, Raisaku, Seiya Iguchi, Milton Munidasa, Naotake Naito, Toru Kuramoto, and Yoshisuke Uenishi

SULFURIC ACID CONCENTRATIONS IN THE ATMOSPHERE OF INDUSTRIAL COMPLEXES AND URBAN AREAS.

(Konbinato nado no taikichu no ryusan misuto ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):234, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

The acid-alkali titration method was studied as a means of measuring sulfuric acid mist in the atmosphere. When sulfuric acid mist is collected there is always the possibility that reaction with alkaline particulates will occur during the collection process Therefore, a cascade centrepetor was used. The determination of sulfuric acid mist was performed with a 0.002 N sodium hydroxide solution. Scaringelli's method and Duboi's trace diffusion method which are supposed to make up for the deficiencies of neutra titration methods were also tested. The actual tests were conducted in Tokyo, West Osaka, Yokkaichi, Amagasaki, and Kawasaki. Starting on July 17, 1970, there were several days of smog in Tokyo, and the data obtained by the above methods in the Meguro area showed a 24-hour average concentration of sulfuric acid of 20 micrograms/cu m.

10719 **APTIC NO. 28625**

Kiyoura, Raisaku, Seiya Iguchi, Toru Kuramoto, Milton Munidasa, Naotake Naito, and Yoshisuke Uenishi

CHARACTERISTICS OF AIR BORNE PARTICULATES IN THE ATMOSPHERE IN INDUSTRIAL COMPLEXES AND URBAN AREAS.

(Wagakuni no toshi, konbinat nado ni okeru fuyu funjin no shoseishitsu ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1): 232, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

Cascade centrepetors were used to assess the size distribution and the chemical composition of suspended dusts, in Amagasaki, Osaka, Yokkaichi, and Tokyo. In addition, high-volume air samplers were used to record the concentration of suspended particulates. At all locations, the concentration exceeded the California standard value of 100 micrograms/cu m. At Yokkaichi, the maximum concentration was 836 micrograms/cu m. Data on water-soluble sulfuric acid ions, nitric acid ions, and ammonium ions are indicated in histograms. Yokkaichi showed the highest ratio of sulfate to the suspended particulates, followed by Amagasaki-West Osaka, and Tokyo-Meguro.

10720 **APTIC NO. 28626**

Fujie, Kimiko and Michio Nakano

SUSPENDED PARTICULATES CONCENTRATION IN OSAKA CITY.

(High Volume Air Sampler ni yoru fuyu funjin no sokutei ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):214, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

High-volume air samplers were used to collect suspended dusts at seven locations in Osaka. Sampling was conducted continuously for 24 hours, and the components analyzed were sulfates, nitrates, pH, and benzene-soluble organic matter. The concentration of suspended particulates and that of sulfates had a log-normal distribution or a distribution close to that at all points. Correlation coefficients for dusts and sulfates and dusts and organic matter are tabulated in addition to the dust and sulfate concentration obtained between 1966 and 1968.

10721 **APTIC NO. 28627**

Fukuoka, Yoshitaka and Tomoka Tanaka

RELATION BETWEEN SO3 DISTRIBUTION AND WIND IN SHUNAN DISTRICT.

(Shunan chiiki ni okeru SO3 nodo bunpu to kaze no kankei). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):217, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

Statistical analyses were performed on sulfur trioxide concentration data obtained in southern Yamaguchi. Analysis by isoquants of concentrations showed that throughout the year, northern to northeastern industrial areas in Kudamatasu, Tokuyama, and Nanyo have the highest concentrations. There are no seasonal differences, apparently due to the supremacy of sea breezes over seasonal winds. Mountains and hills over 100 m in height act as walls to polluted air, and isoquants extend along the valleys. Pollution in general is more concentrated in winter, because of heavy oil combustion. In studying the relationship between an arbitrary location and pollution concentraion, the highest correlation coefficient obtained was 0.61 among 29 locations. In general, there was little correlation.

10722 **APTIC NO. 28628**

Ishinishi, Nobu, Eisaburo Kunitake, Yasushi Kodama, and Yoko Katori

THE AMOUNT OF BENZO(A)PYRENE IN FALL DUST AND SUSPENDED DUST IN NORTHERN KYUSHU DISTRICT.

(Kita-Kysuhu-shi oyobi Fukuoka-shi ni okeru koka baijin oyobi fuyujinchu no Benzo(a)pyrene ryo ni tsuite. Dai-12-ho). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):215, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

Suspended particulates were sampled for benzo(a)pyrene every other month at two locations in Kyushu, at Yawata of Kita-Kyushu, and Fukuoka. Settling dusts were sampled by means of a deposit gauge at an industrial and residential district in Kita-Kyushu and at Omuta. Benzo(a)pyrene in suspended particulates increased in autumn and winter when the smog was formed, and decreased in summer. Benzo(a)pyrene in settling dusts was at a maximum concentration in the industrial area of Kita-Kyushu as was the case in the past, and monthly variations in the concentration were clearly observed. In the commercial district, the average was 10 micrograms/cu m. The concentration was almost nil in Fukuoka. Various monthly data are given for Yawata-Tobata-Wakamatsu, Moji-Kokura, Omuta, and Fukuoka.

10723 **APTIC NO. 28631**

Hiraoka, Masakatsu, Masahiko Takauchi, Arimitsu Ikeda, and Tadahiro Murakami

AIR POLLUTION IN STRUCTURES.

(Kenzobutsunai kuki no osen ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):227,

1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

Carbon monoxide pollution at the Kyoto Central Wholesale Market was investigated. The market is characterized by proximity of roofs of buildings and the use of small automotive vehicles for transporting goods. At six locations, measurements were taken for 24 hrs at 2.4 m abovythe ground. Whether one-hr or eight-hr averages, the concentrations were the highest around 9 am. For a day when the average wind speed was less than 1 m/sec, eight-hr average concentrations were as high as 20 ppm at most locations.

10724 APTIC NO. 28632

Shoji, Hikaru and Tsuneo Tsukatani

SPECTRAL STUDIES ON AIR POLLUTION STANDARDS.

(Taiki kankyo kijin no tokeiteki kenkyu). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):218, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

Automatic measurements of sulfur oxides and suspended particulates in Osaka, Amagasaki, and Tokyo showed that the distribution of hourly variation in concentration has a log-normal distribution. Also, for tracer emission of about 30 min, the variation in concentration at the point of landing approximated a log-normal distribution. The log of the hourly variation chi(t) of the concentration was normally distributed, and spectral density function phi(n) of log(chi (t)) could also be obtained. Spectral analysis of the data from different locations was used to approximate the actual value of the spectrum in the form generally termed the Markov Spectra. As a result, the variation in the distribution form due to averaging time S by geometric average could be obtained. An example is given in which the 99th percentile concentration chi(S) can be expressed in terms of sigma(S), the geometric standard deviation. The 1969 Environmental Standards for Sulfur Oxides are not commensurate with the 'Threshold Values Necessary for Maintaining Human Health' recommended by the Council for the Living Environment in January 1968. Some logical flaws were discovered between the various parts of the environmental standards when the above statistical technique was applied.

10725 APTIC NO. 28633

Mizoguchi, Tsuguo, Hideyuki Nomoto, Yoshinori Ishikawa, and Akiko Miyao

ANALYSIS OF AIR POLLUTION IN OSAKA.

(Osaka ni okeru taiki osen jokyo no ichikosatsu). Text in Japanaese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):220, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

There are 15 air pollution monitoring network stations in Osaka Prefecture, each measuring sulfur dioxide dust, wind and direction, temperature, and humidity. Taking SO2 as one factor, statistical analyses of the data obtained between April 1969 and March 1970 were performed to determine if the stations are all located in appropriate representative areas. Separations by monthly averages showed that there are two groups of stations that manifest distinctly high and intermediate concentrations. Outside the city of Osaka, there are intermediate stations influenced by pollution in the city, those that show very low concentrations, and those that indicate the influence of the Sakai coastal industrial complex. By factor analysis of the correlation coefficients for the relationships between concentrations at each station, distinct groups could be formed. Sakai and Hamadera stations are quite close in terms of the space formed by the eigenvectors; similarly, Suita and Teraguchi comprise another group. The same could be said for Setsuyo and Yao stations.

10726 APTIC NO. 28634

Otsuka, Yukio, Nobuaki Kadoya, Katsuhiko Tanaka, Katsuhisa Fukaya, Noriyoshi Yoshitani, and Saburo Kanno

SURVEYS ON ENVIRONMENTAL POLLUTION BY AUTO-EXHAUST GAS.

(Jidosha haiki gasu ni yoru taiki osen no chosa). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):223, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

Carbon monoxide, nitrogen oxides, lead, meteorological factors, and traffic volume were measured along the main highways in Kanagawa Prefecture. Carbon monoxide and nitrogen oxides were measured by nondispersive infrared analysis and the Saltzman method, respectively, at 2.8 m above the sidewalk. Lead in air was measured by collecting suspended dusts in high-volume air samplers at 1.5 m above ground and analyzing them by atomic absorption spectrophotometry. Traffic volume was calculated as hourly values based on counting for five minutes on the hour. Carbon monoxide was at a maximum in front of the Kawasaki Racetrack, where the 24-hr value was 9.7 ppm. For nitrogen oxides, the total averages were nitric oxide, 0.08-0.22 ppm and nitrogen dioxide, 0.11 ppm. The diurnal variation of carbon monoxide, nitrogen oxides, suspended particulates, and lead showed remarkable similar patterns, and a correlation between Pb and CO could be inferred.

10727 APTIC NO. 28635

Nakano, Kinjii and Toshio Odairo

ENVIRONMENTAL AUTOMOTIVE EXHAUST GAS CONCENTRATIONS IN TOKYO.

(Kankyo taikichu no jidosha haiki gasu sokutei kekka). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1): 244, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

In Tokyo, carbon monoxide was measured at four traffic intersections and lead in air at seven locations. Sampling for carbon monoxide was done with mylar bags at 1.2-1.5 m, above the ground; lead was sampled at the same heights with glass fiber or membrane filters. Carbon monoxide was analyzed by NDIR URA-2 and APMA-1 and lead by atomic absorption spectrophotometry. There were correlations between the average CO concentrations at 100 m away from and behind intersection areas, and concentrations were generally highest at the intersections. However, the correlation between traffic volume and average CO concentration at an intersection was not significant. Lead concentrations were no more than 5 micrograms/cu m, even at intersections. In unpolluted areas, the concentrations were 0.1-0.6 micrograms/cu m. There was a high correlation between lead and CO concentrations.

10728 APTIC NO. 28646

Nakano, Michio

AIR POLLUTION MONITORING.

(Taiki osen monitaringu). Text in Japanese. Shizen (Nature), 25(12):60-67, Dec. 1970.

Chicago's eight policies on a 5-year program beginning in 1963 are presented. The emission of pollutants, kinds and amounts of pollutants, information concerning the concentration of air pollution, diffusion of pollutants, and an air pollution monitoring net in the United States and Chicago are described. The major sources of emissions of air pollutants and changes in pollution mechanism are given. The yearly emission of pollutants from oil fuels, particulate distribution and a smoke dispersion model are shown. The emission and distribution of the sulfur oxides concentration in Osaka Prefecture are given. Osaka is characterized by residential areas mingled with industrial areas which have heavy and chemical industries in western coastal areas, and a group of smaller enterprises in the east. A high concentration smog in the winter forms an inversion layer near the ground. There are 12 monitoring stations for general air pollution observation, 3 stations to observe automobile exhaust gas; there are towers in Osaka and Tsutenkaku which measure sulfur dioxide, dust, wind direction, wind velocity, carbon monoxide, nitrogen oxides, and oxidants. In the southern part of Osaka Prefecture, in Sakai City, although more heavy oil is consumed, there is less sulfur, higher chimney stacks are in use, and the concentration is less than the western area of Osaka.

10729 APTIC NO. 28648

Fukushima, Tetsuji, Takeshi Ohno, Katsumi Saruta, and Etsuo Yoneyama

THE DISTRIBUTION OF CARBON MONOXIDE IN THE URBAN AIR.

(Issanka tanso no shigaichi ni okeru bunpu ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):224, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

Carbon monoxide was sampled by means of a Mylar bag at a busy traffic intersection (12,000 cars/day) in Yokohama. Sampling was conducted at 36 locations within 100-m radius of the intersection. Carbon monoxide was then analyzed by a nondispersive infrared analyzer. The maximum concentration was found not at the corner of the intersection, but at a location about 30 m away where traffic was most congested. The infiltration of pollution to the general area is such that in the upwind direction, the concentration is reduced to half within 30 m, whereas in the downwind direction, the distance is about twice as much. Another set of samples taken at the central location of Yokohama showed that when the carbon monoxide at ground level is only a few ppm in concentration, there is not much change in concentration up to about 14 m above ground. However, when the concentration is over 10 ppm, concentration is halved at the distance of about 10 m from the ground.

10730 APTIC NO. 28650

Hasegawa, Toshio, Akiyoshi Sugimae, Junko Fujii, Yuzuru Matsuo, and Yoshinobu Okuyama

TRACE METALS IN SUSPENDED PARTICULATES. PART II.

(Fuyufunjinchu no kinzokuseibun. Dai-3-po). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):210, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

Suspended particulates were sampled at 12 stations in Osaka. The actual sampling was conducted at the altitude of 10 m for 24 hours every day by means of a high-volume air sampler and cascade centripetor. The particulates were collected on Whatman GF-81 glass fiber filters and the lead contained in them was determined by spectrophotometry. The concentration range for lead was 0.25 to 10.9 micrograms/cu m, with a mean of 2.0 micrograms/cu m. From the cascade centripetor measurements, it was discovered that most of the lead particulates are under two micron in size, and 90% or more can enter the alveoli when breathed with air. In Osaka, there is a maximum of 9.8 micrograms/cu m of respirable lead suspended in the air. Further studies indicated that there is a negative correlation between lead concentration and wind speed in February, but not in June. Apparently meteorological conditions affect the lead concentration much more than wind speed, together with factors such as automobile traffic volume.

10731 APTIC NO. 28653

Kiyoura, Raisaku, Toru Kuramoto, Milton Munidasa, Gunji Kawasaki, Naotake Naito, and Yoshisuke Uenishi

CHARACTERISTICS OF HEAVY METALS IN AIRBORNE PARTICULATES IN INDUSTRIAL COMPLEXES AND URBAN AREAS.

(Wagakuni no toshi, knobinato nado no fuyu funjinchu no jukinzoku seibun no hikakukento). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):233, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

Suspended dust in urban air was analyzed for heavy metals. Dust was collected with a high-volume air sampler, and the glass fiber filter was cut up to one-tenth of the original size and placed in a 100 ml platinum evaporation dish. It was then washed in 5 ml nitric acid, followed by 15 ml hydrofluoric acid, and the resulting solution was evaporated on a sand bath. Another 10 ml of hydrochloric acid followed by 10 ml of perchloric acid was added and dried again. The resulting product was dissolved in 1 N hydrochloric acid, filtered, and 100 ml of the filtrate was accurately measured. The analysis was conducted with an atomic absorption spectrophotometer. Various resonance lines in Angstroms for iron, lead, manganese, nickel, copper, zinc, cadmium, and chromium are listed, together with the lamp amperage.

10732 APTIC NO. 28654

Robinson, Elmer and Robert C. Robbins

ATMOSPHERIC CARBON MONOXIDE IN THE NORTH AND SOUTH PACIFIC OCEAN AREAS.

Preprint, Stanford Research Inst Menlo Park, Calif. 25p., 1971 (?). 16 refs.

Atmospheric carbon monoxide measurements were conducted on shipboard in 1967 and 1968 during five cruises in the north and south Pacific Ocean. Air samples were collected in glass flasks and CO photometrically determined as mercury vapor by an instrument utilizing the reaction of CO with hot mercuric oxide. The CO concentration was highest (about 0.2 ppm) at about 40 degrees north latitude and lowest (0.04 ppm) at about 30 degrees south latitude in the Pacific area. Features of concentration profiles indicated the presence of a significant natural source of CO, probably the ocean; at the same time, the most likely explanation for the maximum zone at 40-50 deg N is considered to be the effect of northern hemisphere pollution sources in this latitude zone. (Author abstract modified)

10733 APTIC NO. 28677

Lewis, T. W.

MONITORING AIRBORNE PARTICULATE CONTAMINATION.

George C. Marshall Space Flight Center, Huntsville, Ala., Manufacturing Engineering Lab., NASA TM-53881, 47p., Sept. 12, 1969.

NTIS: N70-37495

The sizing and counting of the particulate contamination by microscopic examination of a membrane filter through which a known volume of sampled air has been passed is a long, tedious, time consuming procedure. While this examination cannot be eliminated because of the important clues visual examination gives regarding the possible sources of contamination, the requirements for the number of samples taken can be substantially reduced by the substitution of automatic samplers. The automatic electronic airborne particulate contamination monitoring system, which is now installed in the clean room complex of the Valve Clinic, gives a continuous readout of the relative level of the airborne contamination. The instruments respond well and are sufficiently sensitive to disclose variations in the contamination levels in the rooms. There are at least two ways in which these instruments may be improved: the first is by lowering the height of the sampling probe to bench level; the second is by installing an alarm system that will give warning when the upper level of contamination is being approached. (Author summary)

10734 APTIC NO. 28771

Nakagawa, Yasusuke, Isao Ogawa, Masayoshi Mizukami, Akira Matsuura, and S. Kaji

SAMPLING AND ANALYZING OF FLUORIDES. PART I.

(Hasseigen kojo ni okeru fukkabutsu no sanpuringuho oyobi bunsekiho ni tsuite. Dai-1-po). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):89, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

On the assumption that the present JIS method of measuring fluorides as gases alone is inadequate for determining total fluorides emitted to the atmosphere in industrial areas, the following experiment was conducted. Fluoride gases as well as particulates were collected inside and outside plants by dust tubes with copper wool and polyethylene impingers. The items sampled were gases and mists under 20 micron and those particulates over 20 micron. The hydrogen fluoride values measured are tabulated. They indicate that a substantial amount of HF is also contained in particulates. Total fluoride was 2.30 to 6.53 HF ppm in one factory and 24.80 to 30.60 HF ppm in a second factory, B. In the area of the second factory, values were 325 to 351 ppb.

10735 APTIC NO. 28785

Ito, Eiichi, Kiyoshi Kubo, and Akio Wada

STUDY ON POLLUTION BY LEAD ON THE IMPORTANT PLACES FOR TRANSPORTATION.

(Kotsu yochi ni okeru namariosen no mondaiten ni tsuite). Text in Japanese. Nagoya-shi Eisei Kenkyushoho (Ann. Rept. Nagoya City Health Res. Inst.) no. 16:115-118, 1969. 3 refs.

The results of lead estimation concentrations in the air at nine important places for transportation and three contrast places in Nagoya City and the analytical method of lead in the air are described. The investigation was made from February to March, 1970 for contrast places and in June for the important places for transportation. Sampling was made continuously from 9:00 am to 4:00 pm and a high sensitive polarography (I) and atomic absorption analytical method (II) were used for the analysis of lead in suspended particulate material. Average and maximum values of lead quantity at the important places for transportation were 2.38 micrograms/cu m and 5.40 micrograms/cu m, respectively. Lead quantity decreased according to the distance from the important places for transportation. Lead quantity was also found as suspended material all over the city, for it was also detected at contrast points (average value 0.75 micrograms/cu m). As a result of the comparison of analytical values of lead by analytical methods (I) and (II), values by method (I) were higher than those by method (II). The atomic absorption analyzer was affected by various materials (especially sodium) contained in the filter used for lead sampling. Therefore, method (I) was more correct than method (II) when sampling was carried out using filters.

ATMOSPHERIC INTERACTION

10736 APTIC NO. 27903

Trautner, Richard P.

RELATIONSHIP OF CURRENT FROM CHARGED ATMOSPHERIC AEROSOLS TO THEIR MASS CONCENTRATION.

Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 27p., 1970. 11 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 63rd, St. Louis, Mo., June 14-18, 1970, Paper 70-123.)

The relationship between the current from charged atmospheric aerosols to their mass concentration was determined. Atmospheric aerosols were passed through an electrical field followed by collection of the particulate at the exit of a mobility analyzer with the current produced as a function of the number and size of particles within the aerosol. Mass concentration was measured using membrane filters sampling concurrently the atmospheric aerosol from which the current parameter originated. The current and mass concentrations were then statistically evaluated to determine whether the current reading could be used to predict mass concentration. Three size groups were selected which included 0.015 micron, 0.08 micron, and 0.5 micron. Conclusions indicated a relatively weak relationship between log current versus log mass. In an attempt to increase the degree of relationship between mass concentration and current from charged aerosols, 16 measurable meteorological and sampling variables were evaluated. Correlation coefficients were calculated on the subgroups and compared to overall results based on 99 runs. Relative humidity showed the greatest possibility for improvement of the degree of relationship between current and mass concentration. However, the number of observation precluded further mathematical partitioning. (Author abstract modified)

10737 APTIC NO. 27914

Takamatsu, Takeichiro and Masaaki Naito

THE PRESENT STATUS OF AIR POLLUTION CONTROL.

(Taiki osen seigyo no genjo). Text in Japanese. Seigyo Kogaku (J. Japan Assoc. Autom. Control Engrs.), 14(1):2-10, Jan. 1970. 22 refs.

The feed-back type control of air pollution is not sufficient in that when a large area is considered as a process, the dynamic process has the following characteristics: the system as the air resource of a large city is very large in scale; the meteorological factors that control the system vary irregularly and greatly; and the topological factors further complicate the matter. Therefore, the general trend in air pollution control is to take the Los Angeles formula, the 'adapredictive' control, where the error between the predicted and actual values of measurement are graduall lessened by correcting the prediction method. The method used in Osaka Prefecture is described. A mathematical model is used to predict the future concentration of pollutants, and parameters are gradually corrected in order to minimize the sum of the square of the difference between the predicted and the actual values of concentration. The prediction of meteorological factors is yet to be improved. The actual control mechanism depends on the objective function, for example, to minimize the economic loss of the industry to be controlled and the loss of benefit due to pollution to the residents. Constraints, state variables, and policy variables are still to be developed fully. Pollution contro in Tokyo, New York, Los Angeles, and Chicago is described.

10738 APTIC NO. 27932

Junge, Christian E.

RECENT INVESTIGATIONS IN AIR CHEMISTRY.

Tellus (Uppsala), vol. 8:127-139, May 1956. 12 refs.

New results of chemical analyses of natural aerosol particles in Florida and in the Boston area are presented. These data are compared with the results obtained earlier at various other locations. The continental and maritime components of NH4, Na, Cl, SO4, and NO3 can be separated for two different size ranges, large particles (radius 0.08 micron to 0.8 micron) and giant particles (radius 0.8 to 8 micron). It is found that the continental influence on aerosols extends far into the ocean. The nitrate content of the particles presents an especially interesting problem, since it appears that the major part of NO3 stems neither from a continental nor maritime source, but from a certain area along the coast. A comparison is made of the total amounts of material found in the large and giant particles at the various locations. Information gained from this comparison provide the basis for conclusions regarding the size distribution of aerosols. A pronounced difference between maritime and continental distributions is noted. The concentrations of the corresponding traces of NH3, SO2, nitrogen oxides, and chlorine components were measured in Florida and at other locations simultaneously with the chemical analyses of the aerosols. For most components, the concentrations of the gas trace is considerably higher than that for the corresponding substances in the aerosols. The importance of these findings for air chemistry is discussed. (Author abstract)

10739 APTIC NO. 27941

Went, F. W.

THE NATURE OF AITKEN CONDENSATION NUCLEI IN THE ATMOSPHERE.

Proc. Natl. Acad. Sci. U. S., 51(6):1259-1267, June 1964. 4 refs.

Laboratory and field experiments showed that organic substances, an specifically alpha-pinene, can form condensation nuclei (cn) when subjected to high light intensities in the presence of nitrogen dioxide or iodine as light-absorbing catalysts. These nuclei range in size from 10 to the minus 7th power to 10 to the minus 5th power cm, in the same size range as the smaller Aitken nuclei in the atmosphere. A daily rhythm in the concentration of cn occurs: it is lowest in the late night hours, rises suddenly about 20 per cent during the first light hours (especially the nuclei of less than 0.13 micron diameter), increases another 10 per cent during th rest of the day, and decreases again after sunset. Whereas in cities these cn are related to automobile traffic, in nature they parallel the production of organic vapors by the vegetation. Whereas near the ground the number of cn decreases through impactio with solid surfaces and agglomeration of the smaller particles, in the higher atmosphere two other mechanisms seem to control the cn, namely, accumulation of cn in cloud surfaces, and precipitation of cn by rain and snow. Filtration of cn from the air indicates that at any one time about 0.0001 mg particulate material is in the air over each sq cm of Ozark country; measurement of insoluble solids in rainwater indicates a total precipitation of .0005 mg/sq cm of land surface per year. This suggests a world production of at least 500 times 10 to the 6th power tons of submicroscopic particulate organic matter per year, more than our total steel or cement production.

10740 APTIC NO. 27987

Hubbard, Jerry S., James P. Hardy, and N. H. Horowitz

PHOTOCATALYTIC PRODUCTION OF ORGANIC COMPOUNDS FROM CO AND H20 IN A SIMULATED MARTIAN ATMOSPHERE.

Proc. Natl. Acad. Sci. U. S., 68(3):574-578, March 1971. 19 refs.

Carbon dioxide C14) and organic C14 compounds are formed when a mixture of CO (C14) and water vapor diluted in CO (C14) or N2 is irradiated in ultraviolet light in the presence of soil or pulverized vycor substratum. The CO (C14) is recoverable from the gas phase, the C14 organic products from the substratum. Three organic products have been tentatively identified as formaldehyde, acetaldehyde, and glycolic acid. The relative yields of CO (C14) and C14 organics are wavelength and surface- dependent. Conversion of CO to CO2 occurs primarily at wavelengths shorter than 2000 A, apparently involves the photolysis of water, and is inhibited by increasing amounts of vycor substratum. Organic formation occurs over a broad spectral range below 300 A and increases with increasing amounts of substratum. It is suggested that organic synthesis results from adsorption of CO and H20 on surfaces, with excitation of one or both molecules occurring at wavelengths longer than those absorbed by the free gases. This process may occur on Mars and may have been important on the primitive earth. (Author abstract)

10741 APTIC NO. 28069

Ministry of International Trade and Industry (Japan), APCS Research Group

FORECASTING SYSTEM FOR AIR POLLUTION CONTROL, INTERIM REPORT PART 2.

(Taikiosen boshi notameno yosoku shisutemu nitsuite, chukan hokoku (sono 2)). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 5(6):48-62, Nov. 1970.

Computer simulation of a wind tunnel experiment for estimating diffusion coefficients is discussed. A model is employed 1/2500 the scale of the area with existing or anticipated chimneys. The air stream in the tunnel is chosen to agree with the standard condition of 1-3% isotropic turbulence and a 250-m boundary layer along a coastal area. As part of a large scale project, a computer program for simulating air pollution forecastin was established in 1969. System parameters for the effective chimney height of 100-200 m were determined, as were diffusion parameters for industrial areas with a more or less flat topography. Due to this achievement, diffusion can be simulated in the wind tunnel within a 10% error (in terms of ground surface concentration).

10742 APTIC NO. 28081

Molenat, J. and P. Bapseres

DISPERSION OF POLLUTANTS AND MICROCLIMATE IN LACQ, FRANCE.

(Dispersion des polluants at microclimat, a Lacq). Text in French. Ann. Mines (Paris), no. 11:21-30, Nov. 1970.

The natural gas wells of Lacq, France, produce gas containing 15% hydrogen sulfide, which is extracted by a process that yields 1.6 megatons of sulfur per year. Waste gases, which are produced at the rate of 20 million cubic meters per day, have a sulfur dioxide content of about 0.6%, which is an environmental hazard. Meteorological studies were made for the purpose of determining the weather conditions in which damage was most likely to occur, as the basis of a warning system, permitting plant supervisors to reduce production at critical times. The meteorological study included the measurement of temperature and humidity, wind direction and velocity, precipitation, and the incidence of sunlight. Temperature and humidity readings were taken at ground level and from a balloon which reached a maximum height of 800 meters. On the basis of research, the standard procedure developed calls for a forecast each day at 5 pm from the meteorological center at Bordeaux, giving the degree of risk, the probability of fog occurring during the night and on the following morning, and the degree of turbulence that is expected during this same period of time. Upon notification from Bordeaux, the plant laboratory then confirms these predictions, maintaining surveillance of atmospheric conditions. The laboratory is in constant contact with plant supervisors by phone.

10743 **APTIC NO. 28132**

Saijo, Tatsuya, Yayoe Tominaga, Fumio Hasegawa, and Katsuhisa Taguchi

ON THE AIR POLLUTION OF HITACHI CITY.

(Hitachi chiku no taiki osen ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):208, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 10th, 1970.)

Settling dusts and sulfur oxides were measured between January 1968 and December 1969 in the Hitachi area. Settling dusts were measured by means of deposit gauges and sulfur oxides by the PbO2 method. Meteorological data were obtained from Mito Regional Meteorological Observatory. The climate in the general area is relatively mild, wind velocity ranges from 2-4.5 m/sec, and the principal wind directions are WNW and NW in winter and SSW and SW in summer. The amount of settling dusts is small in winter but large in the rainy season, and the total yearly amount has increase over the last five years. There were positive correlations between wind direction and settling dusts. Sulfur oxides concentrations were high in winter and low in summer. At some locations, the winter concentrations showed a positive correlation with the WNW seasonal wind, apparently due to the smoke from a mine.

10744 **APTIC NO. 28136**

Odaira, Toshio, Saburo Fukuoka, Mitsuru Udagawa, S. Izumikawa, Katsumi Saruta, and T. Murase

INVESTIGATION ON THE AIR POLLUTION OF SULFUR DIOXIDE IN KEIHIN DISTRICT.

(Keihin chiku ni okeru koiki aryusan gasu osen ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):201, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 10th, 1970.)

Wide-area air pollution is caused by the emission of sulfur dioxide from stacks over 70 m high in the Keihin industrial complex. To clarify the mechanism of this pollution, data on sulfu dioxide concentration and wind speed and wind direction were analyzed for December 1968 and August 1969. From the pattern of daily variation in SO2, it was seen that SO2 concentration in the industrial area depends not only on meteorological conditions but also on the level of activity of the stationary sources. In winter, pollution is due more to heating than industrial activities. In summer and in winter, morning peaks (around 8 am) take place in the absence of wind. In summer, when the upper wind is southerly and the velocity is 2-3 m/s, the area affected by the Kawasaki-Tsurumi industrial area increases. The range of SO2 concentration at various locations in Tokyo depends on distinct wind directions.

10745 **APTIC NO. 28155**

Oshino, Akira and Fujihoko Kure

FORECASTING ENVIRONMENTAL SO2 CONCENTRATION IN THE INDUSTRIAL AREA ALONG OSAKA BAY.

(Osakawan engan kogyo chiiki niokeru kankyo SO2 nodo no yosoku keisan nitsuite). Text in Japanese. Preprint, Osaka Prefecture Center for Public Nuisance Surveillance (Japan), 52p., 1968 (?).

The quantitative relation between pollutant source and annual average environmental concentration of sulfur dioxide in Osaka was studied. The object area of 22 km in north-to-south direction and 10 km in east-to-west direction was divided into a network of 1 km and indexed. Pollutant sources were classified into five levels according to chimney height. Sulfur dioxide emission was calculated for 1967 according to prefectural and municipal survey reports. The projection for 1972 was also made, based on 1967 survey. In calculating effective source height, Bosanquet's equation was employed as a basis. Average annual ground concentration was calculated by the Nashville method. Predicted values were compared with the observed 1967 values by the use of conductivity and lead dioxide methods. In general agreement between the two sets of values was good. For small-scale sources, however, local pollution occurred, which was beyond the scope of the present calculation. The calculation did not consider wind speeds less than 1 m/s, the effects of which will be studied at a latter date. The most important but difficult aspect in the forecasting was accurate estimation of emission rate and other source characteristics. The method of calculation is concluded to be appropriate for practical use, but there is room for the development of a more accurate and simple system of computation, such as a diffusion model.

10746 **APTIC NO. 28163**

Matsui, Hideo

FUNDAMENTAL STUDIES ON THE AIR POLLUTION. PART V. TOPOGRAPHICAL EFFECTS IN THE ATMOSPHERE OF NAGOYA CITY.

(Taikiosen nikansura kisoteki kenkyu (dai 5 ho) Nagoya shinai no taikiosen to chikei). Text in Japanese. Meijo Daigaku Rikogakubu Kenkyu Hokoku (Repts. Fac. Sci. Technol. Meijo Univ.), no. 10:349-359, Aug. 1970. 5 refs

Air pollution surveys were made in Nagoya City during July 19-24, 1968. This region is a large basin facing the Ise Bay to the south, with a ring of mountains on the other three sides. An isothermal layer of stratified air extends over the city at levels which usually range between 300 and 700 m. This isothermal layer is brought about by the presence of a semipermanent high pressure area over the central part of Japan, and it is present during the major portion of the summer, preventing both vertical and lateral dispersion of air pollutants. During periods of low wind velocity or calms, the deposition of aerosols by convection settling and impaction on land and other irregular surfaces increases. The eddies produced by neaby buildings and man-made obstacles may result in erratic dispersion of contaminants. Fumes from vehicles are emitted in the street near ground-level and have little time for dispersal before the polluted air is inhaled. (Author abstract modified)

10747 APTIC NO. 28176

Misaki, Masao

SUBMICRON AEROSOL.

(Sabumikuron erozoru). Text in Japanese. Shizen (Nature), 25(12):72-74, Dec. 1970.

Submicron particles should be studied in relation to air pollution, which now exists on a global scale and threatens to modify global climate. In Japan, no full-fledged study of the submicron aerosol has been made for at least 10 years. The size distribution of particulates has been studied more recently, but not the size distribution of the aerosol structure. Photochemical smog implies the existence of aerosols in high concentration. Junge's diagram indicates that the majority of submicron particles are between 0.01 and 0.1 micron. Because an 0.01-micron particles takes a day to fall one cm in contrast to one sec for a 10-micron particle, submicron particles can be assumed to remain in the atmosphere permanently and to spread over a wide distance. Off the coast of Japan, pollution of air at the ocean surface by submicron lead particles extends for hundreds of kilometers. Electroconductivity studies suggest that air on the ocean is twice as polluted as it was 50 years ago. Although Brownian movement promotes the agglomeration of small particles and their scavenging by rain, the possibility exists that man can be adversely affected by aerosols, particularly radioactive ones.

10748 APTIC NO. 28187

Gifford, F. A., Jr., Walter M. Culkowski, and William F. Hilsmeier

COMPUTATION OF ATMOSPHERIC DISPERSION PARAMETERS AT REACTOR SITES BY A SMOKE PLUME RATIO METHOD.

Pollut. Radioact. Milieux Gazeux, Proc. Symp., Saclay, France, 1963, p. 149-153. 14 refs. (Nov.)

NTIS: CONF-337-41

Formulae previously obtained for determining Sutton diffusion parameters from simple measurements of smoke plume length-width ratios are summarized; four equations are given. Using these, diffusion parameters at or near four U. S. Nuclear Reactor installations were determined; in each instance, the requisite plume length-width ratio information was obtained from published photographs. For several of the resulting estimates of diffusion parameters, an independent estimate based on actual measured air concentration measurements is available. The 'observed' diffusion parameter values (those inferred from air concentration measurements) and the values predicted by the present method are in reasonable agreement, although the ratio method values are somewhat larger. The ratio method is distinguished by its simplicity and extreme economy. On the theoretical side, it is based on exactly the same diffusion models that are ordinarily employed in more elaborate reactor site diffusion studies. It should prove to be a useful, practical method by which to determine diffusion parameters at reactor sites, particularly sites where a large, permanent meteorological office is not contemplated, or where the expense of more elaborate atmospheric sampling studies of diffusion does not seem to be warranted.

10749 APTIC NO. 28192

Leavitt, Jack M., Seymour B. Carpenter, John P. Blackwell, and Thomas L. Montgomery

METEOROLOGICAL PROGRAM FOR LIMITING POWER PLANT STACK EMISSIONS.

Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 28p., 1970. 7 refs. (Presented at the Air Pollution Control Association Annual Meeting, 63rd, St. Louis, Mo., June 14-18, 1970, Paper 70-49.)

A meteorological forecast and field measurement program was developed for limiting stack emissions to preserve the air quality during adverse atmospheric dispersion conditions. Meteorological and plume dispersion criteria, developed from analysis of prior experience, govern the program. The criteria values are designed for limiting surface sulfur dioxide concentrations below an established threshold level. Daily forecasts of the vertical wind and temperature distribution, maximum surface temperature, and sky conditions are issued every afternoon. Through use of power plant computer facilities, the forecast data are processed to determine quantitative criteria values. If the values indicate that the threshold level may be exceeded, an Air Pollution Control Notice (APCN) is issued that afternoon for the period 0900-1400 CST on the following day, which is the expected period of maximum sulfur dioxide surface concentrations. The APCN specifies the allowable SO2 emission rate, which should prevent surface SO2 concentrations from exceeding the established threshold level. The APCN condition identified with the newer and larger power plants with high stacks are associated with the one principal regional weather pattern: a large high-pressure system, with weak to moderate anticyclonic circulation and pronounced stability throughout the lowest few thousand meters. With the trapping or limited mixing-type dispersion, relatively high surface concentrations may persist for 2-5 hrs. (Author abstract modified)

10750 APTIC NO. 28193

Atkins, Patrick R.

VISIBILITY REGULATIONS APPLIED TO STACK DISCHARGES.

Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 14p., 1970. 4 refs. (Presented at the Air Pollution Control Association, Annual Meeting 63rd, St. Louis, Mo., June 14-18, 1970, Paper 70-82.)

An expression relating downwind visibility to absorbance readings a the stack is developed by combining a dispersion model and light scattering equations, resulting in a simple equation which can be used as a basis for control regulations. Such an approach allows industry to take advantage of the natural assimilative capacity of the atmosphere, is not dependent on the subjective evaluation of an observer, and does not require that a fixed regulation be applied to all stacks regardless of size, exit velocity, location, etc. The equation can only be used if no reactions occur in the exhaust plume which affect the particle size distribution. In addition, a 'grace distance' must be granted within which visibility criteria are waived; the magnitude this distance can have a pronounced effect on the allowable emission rate. In general, this type of approach to stack discharge regulation seems to be more equitable than the methods presently used. Field studies should be conducted to validate the expression developed and to test its feasibility. (Author summary modified)

10751 APTIC NO. 28200

Badcock, Charles C., Howard W. Sidebottom, Jack G. Calvert, George W. Reinhardt, and Edward K. Damon

THE MECHANISM OF THE PHOTOLYSIS OF SULFUR DIOXIDE-PARAFFIN HYDROCARBON MIXTURES.

Preprint, Ohio State Univ., Columbus, Dept. of Chemistry and Ohio State Univ., Columbus, ElectroScience Lab., 27p., 1970. 28 refs.

The mechanism of the photochemical reactions of sulfur dioxide- hydrocarbon mixtures was studied through observations of the sulfur dioxide triplet molecule emission. Lifetimes of the phosphorescence decay of triplet-SO2 were determined in SO2- hydrocarbon mixtures, while the triplet was excited directly using a 3828.8 A laser pulse. The following bimolecular triplet-SO2 quenching rate constants for the paraffin hydrocarbons were estimated from the slopes of plots of 1/tau versus the hydrocarbon pressure in experiments at constant pressure of SO2 and a temperature of 25 deg: methane, (1.16 plus or minus 0.16) times 10 to the 8th power; ethane, (2.09 plus or minus 0.21) times 10 to the 8th power; propane, (5.11 plus or minus 0.58) times 10 to the 8th power; n-butane, (12.3 plus or minus 1.7) times 10 to the 8th power; and isobutane, (15.8 plus or minus 1.9) times 10 to the 8th power 1./mole-sec. These data and the suggested reactio mechanism fit well with the previously published experimental data. The triplet molecule of sulfur dioxide is concluded to be alone responsible for the photochemistry observed in SO2-hydrocarbon mixture photolyses in both the first allowed and the forbidden absorption bands of SO2. Speculation is given on the detailed mechanism of the triplet-SO2 quenching reaction with the paraffin hydrocarbons. (Author abstract)

10752 APTIC NO. 28220

Nonhebel, G.

METEOROLOGICAL FACTORS AFFECTING CHIMNEY DISCHARGES.

In: Gas Purification Processes. G. Nonhebel (ed.), London, George Newnes Ltd., 1964, Chapt. 18, p. 810-823. 11 refs.

The major meteorological factors affecting the adequate dispersal of flue gases are discussed. These are the force and direction of the wind for overall directional movement; the internal movement within the overall wind flow, i.e., eddy diffusion, which accounts for the dilution and dispersion of the gases within the wind; and the vertical temperature gradient in the atmosphere above the 'smoke'-trail. Also reviewed are the effects of neutral and unstable atmospheres and inversions on the behavior of chimney plumes. Data are compiled on the frequency of surface inversions and calm anticyclonic weather in winter.

10753 APTIC NO. 28274

Ingram, William T. and Louis C. McCabe

THE EFFECTS OF AIR POLLUTION ON AIRPORT VISIBILITY.

J. Sanit. Eng. Div., Proc. Am. Soc. Civil Engrs., 84(SA1):1543-1 to 543-18, Feb. 1958. 11 refs. (Presented at the American Society of Civil Engineers, Sanitary Engineering Division, New York, Oct. 1957, Paper 1543.)

The effects of air pollution on airport visibility and possible sources of atmospheric contaminants at the three New York airports were investigated. Safety standards at airports require that aircraft be operated on instrument control under certain visibility conditions. Poor visibility produces airport congestion, delays in flights, losses in operating time, and consequently increased operating costs. Hazards and nuisance increase since aircraft must descend to a lower level before establishing ground contact prior to landing. Flight takeoffs are frequently impeded by limited ground visibility, causing an increase in taxi time, unnecessary operation of aircraft engines at idling speed, wasted fuel, and increased costs to air lines. Atmospheric contaminants include combustion products from heating fuels, effluents from chemicals and metallurgical processes, refineries, disposal plants, burning dumps, incinerators, and motor transportation. There is no justification for singling out any one industry or municipal source of smoke emission as the basic cause of haze or smog in the New York metropolitan area.

10754 APTIC NO. 28297

Tokyo Metropolitan Government (Japan)

STUDY ON FORECAST FROM METEOROLOGICAL FACTORS OF SULFUR DIOXIDE POLLUTION. (FIRST AND SECOND REPORTS).

(Kishoyoso karano aryusangasuosen no yosoku ni kansuru kenkyu--Daiippo, Dainhiho). Text in Japanese. Rept. Kogai Kenkyusho 1-0-8, 101p., Nov. 1970.

Results are reported for a study, undertaken by the Tokyo Metropolitan Government in collaboration with the Japan Weather Association, of the feasibility of forecasting sulfur dioxide pollution on the basis of meteorological factors. The objective of the study was to distinguish weather conditions likely to increase SO2 density from those likely to decrease it. Data on SO2 density were obtained at 9 points throughput the Tokyo metropolitan area from January 1966 to December 1968, while meteorological data were obtained from observations in Tokyo and neighboring prefectures. A day of high SO2 pollution was defined as one where the SO2 density was 0.2 ppm or higher for six or more hours. During the two-yr period, there were 135 days of high sulfur dioxide pollution. The majority (57) occurred in winter; the remainder in decreasing order of frequency occurred in spring and summer. A study of the relation between atmospheric SO2 density and barometric distribution yielded seven particular barometic distribution patterns influencing SO2 density. Other meteorological factors, such as wind and temperature, were analyzed against SO2 density by season, locality, etc. In the absence of sufficient long-term meterological data, the approach ultimately adopted for forecasting daily SO2 density was based on the previous day's weather conditions. Forecasts made in this manner are compared with measured SO2 values.

10755 APTIC NO. 28323

Rat'kov V. M.

DAILY OZONE VARIATIONS.

Bull. Acad. Sci. USSR, Phys. Atmos. Oceans (English translation from Russian of: Izv. Akad. Nauk SSSR, Fiz Atmosfery i Okeana), 6(3):156-159, March 1970. 22 refs.

A series of numerical experiments were performed to determine nocturnal and diurnal vertical ozone profiles in the mesosphere. The results suggest that classical photochemical theory cannot explain the nocturnal increase in total ozone layer thickness observed from the earth. According to the classical theory, recombination of 'unimpaired' atmospheric oxygen atoms at night may lead to the formation of additional ozone at certain altitudes. Errors are assumed to have been made in the numerical experiment.

10756 APTIC NO. 28357

Byzova, N. L. and E. K. Garger

EXPERIMENTAL STUDY OF DIFFUSION PARAMETERS WITH THE AID OF SMOKE PLUMES.

Bull. Acad. Sci. USSR, PHys. Atmos, Oceans (English translation from Russian of: Izv. Akad. Nauk SSSR, Fiz Atmosfery i Okeana), 6(10):593-599, Oct. 1970. 18 refs.

Measurement results of the relative and adveraged lateral variances of smoke plumes at 100 m level over the earth's surface are described. The validity of a Gaussian distribution of instantaneous axis ordinates is examined, as is a stationary case caused by mesoscale vorticity. The rate of dissipation of turbulent energy is evaluated by two independent methods. (Author abstract modified)

10757 APTIC NO. 28375

Kettner, Helmut

THE 95% AND THE MEAN VALUE AS BASIC CHARACTERISTIC EMISSION VALUES OF SO2.

(Der 95%-Wert und der Mittelwert als Kenngroessen der Grundbelastung fuer Schwefeldioxid). Text in German. Staub, Reinhaltung Luft, 31(1):11-13, Jan. 1971. 10 refs.

A study designed to determine whether the laboriously arrived at mean emission value can be substituted by an equivalent but more easily achievable entity disclosed that 95% of the integrated frequency of sulfur dioxide concentration for all weather conditions approximately corresponds to the value of 97.5% which disregards diurnal inversions; it appears to be suitable as the characteristic emission value for the basic load. Only the mean value for all weather conditions is really suitable for this purpose. This value exhibits a high correlation (r equals 0.94) to the 95% value for all weather conditions.

10758 APTIC NO. 28387

Bigg, E. K.

STRATOSPHERIC POLLUTION AND VOLCANIC ERUPTIONS.

Weather (London), 26(1):13-18, Jan. 1971. 5 refs.

A series of color photographs of the horizon were taken in the southern hemisphere from an altitude of 20 km before and after the eruption of Mount Agung in Indonesia in 1963. Specifically, the photographs covered the periods 1961-1964, 1966, and 1967 to the present. They showed the way in which light scattering particles were distributed below the camera, the saturation and colors also giving some information on quantity and size of material and some indication of how much lay above the camera. For several months after the eruption, the sky above 20 km increased in brightness relative to the horizon at all latitudes. The presence of a greenish hue indicated reduced particle size. Electron microscope analysis of particles collected by the aircraft from which the pictures were taken showed an apparent change in the nature of the particles in the stratosphere. Before the eruption, large particles consisting mainly of ammonium sulfate were found. After the eruption, whole liquid drops were collected, consisting largely of sulfuric acid. Theories of the formation of ammonium sulfate and sulfuric acid in the stratosphere are discussed. Also noted is the possible effect of water vapor from high-flying aircraft on the highly hygroscopic acid droplets.

10759 APTIC NO. 28400

Karol', I. L. and S. G. Malakhov

INTERNATIONAL SYMPOSIUM ON ATMOSPHERIC TRACE CONSTITUENTS AND ATMOSPHERIC CIRCULATION (8-13 SEPTEMBER 1969, HEIDELBERG, GERMANY).

Bull. Acad. Sci. USSR, Phys. Atmos. Oceans (English translation from Russian of: Izv. Akad. Nauk SSSR, Fiz Atmosfery i Okeana), 6(3):180-182, March 1970.

Approximately 110 papers, divided into 11 sections, were delivered at the 1969 International Symposium on Atmospheric Trace Constituents and Atmospheric Circulation. By comparison with the 1965 symposium, there was an increase both in the total number of papers and individual sections. Topics covered were as follows: tracers and transport processes; radioactive aerosol transport and fallout; migration of carbon (14) and tritium in the atmosphere and ocean; aerosol formation and removal processes; aerosol distribution and composition; atmospheric trace gas distribution; upper atmosphere constituents; chemical composition of aerosol air; cloud water and water of solid and liquid precipitation in different geographical regions; emanations and daughters as tracers; and cosmogenic isotopes as tracers. The general content of the papers in each section is briefly indicated and some significant findings are noted.

10760 APTIC NO. 28412

Eschenroeder, Alan and Jose R. Martinez

MATHEMATICAL MODELING OF PHOTOCHEMICAL SMOG.

Preprint, American Inst. of Aeronautics and Astronautics, New York, 11p., 1970. 43 refs. (Presented at the Aerospace Sciences Meeting, 8th, New York, Jan. 19-21, Paper 70-116.)

Chemical kinetics and atmospheric transport processes are combined in a finite difference formulation to compute concentration histories for photochemical smog. Although air pollution models are still in an early stage of development, their validation will provide the link needed to establish the source emission limits required to achieve desired air quality standards. This approach can be broadened to answer questions of social and economic significance for different ameliorative strategies. The kinetics are expressed as a lumped parameter reaction mechanism which was derived from laboratory data in the literature. Diffusion coefficients, which depend on height and on time, come from atmospheric measurements. Inputs consist of source inventories for the Los Angeles basin and the solar irradiation curves for the appropriate days. Predicted time histories of reactive hydrocarbons, oxides of nitrogen, and ozone are consistent with the variations observed at an air monitoring station. Present deviations from observations are likely to be explained by imprecision in the large variety of inputs, but there is a good basis for expecting these to be resolved within existing instrumental techniques and within practical limits of computer capability. With refined descriptions of advection, the mathematical model will serve as a tool in planning legislation and guiding urban planning in the future. (Author abstract modified)

10761 APTIC NO. 28418

Csanady, G. T.

ATMOSPHERIC DISPERSAL OF HEAVY PARTICLES.

(La dispersion des particules lourdes dans l'atmosphere). Text in English and French. p. 299-309, 1964 (?). 14 refs.

An adaptation of Sutton's 1953 formula describing the gaseous diffusion of particles with appreciable free falling velocity is currently the best illustration of the turbulent diffusion and deposition of atmospheric dust particles. Predictions based on the modified formula are briefly reviewed. Recent experimental results suggest that the theory adequately predicts dust fall at large distances from a chimney but grossly underestimates it in the immediate neighborhood of the chimney. The reason for this is probably due in part to the recently discovered 'effect of crossing trajectories,' according to which heavy particles escape from turbulent eddies before the break-up of the latter. If the particles were gaseous, the eddies would transport them over a large distance and dispersion would be more efficient. Experimental and theoretical research into the effect of fall velocity on dust dispersal rates is continuing. (Author abstract modified)

10762 APTIC NO. 28449

Tomson, N. M.

PATTERNS OF SELF-REMOVAL OF INDUSTRIAL EMISSIONS FROM ATMOSPHERIC AIR.

(Zakonomernosti samoochishcheniya atmosfernogo vozdukha ot promyshlennykh vybrosov). Text in Russian. Gigiena i Sanit., no. 3:25-29, 1951.

The effects of scattering, dilution, precipitation, and oxidation of industrial pollutants in the atmosphere is examined. Data on lead emission (1624 g/day) from a 35-meter stack at a lead-plated cable factory, gathered in 1940-41, are presented. Data on sulfur dioxide and nitrogen oxides emissions from a 26-meter stack, and hydrochloric acid emissions from a 15-meter ventilation shaft are also tabulated.

10763 APTIC NO. 28457

Laktionov, A. G.

HEIGHT DISTRIBUTION OF AEROSOL PARTICLE CONCENTRATION AND DETERMINATION OF COEFFICIENTS OF VERTICAL TRANSPORT IN FREE ATMOSPHERE.

(Raspredeleniye po vysote kontsentratsii chastits aerozolya i opredeleniye koeffitsiyentov vertikaln'nogo peremeshcheniya v svobodnoy atmosfere). Text in Russian. Izv. Akad. Nauk SSSR, Ser. Geofiz., no. 9:1397-1406, 1960. 17 refs.

A formula is derived for determining the concentration distribution of particles of different sizes as a function of height, and a method is presented for determining the coefficients of turbulent mixing in free atmospheres as a function of the decrease in aerosol particle concentration with height. Changes in coefficients of turbulent mixing of aerosol particles with height, determined for different times of the year, different times of the day, and for different underlying surfaces are plotted.

10764 APTIC NO. 28465

Massachusetts Inst. of Tech., Cambridge

SUMMARY OF FINDINGS AND RECOMMENDATIONS.

In: Man's Impact on the Global Environment. Cambridge, Colonial Press, 1970, p. 3-36.

The findings and recommendations of a number of month-long study/discussion work groups held at Williams College, Williamstown, Mass. in 1970 are presented for a series of problems concerned with the indirect effects of pollution on man through changes in climate, ocean ecology, or in large terrestrial ecosystems. The global environmental problems studied were: climatic effects of increasing atmospheric carbon dioxide, of the atmospheric particle load, and of tropospheric and stratospheric contamination by sub and super-sonic aircraft; the ecologic effects of nutrients in estuaries, lakes, and rivers; and the ecologic effects of petroleum in the oceans, of DDT and other toxic persistent pesticides, and of mercury and other toxic heavy metals. The recommendations emphasize the need to gather more information about pollution of the planet in order to understand the impact of man's activities and to make possible reliable projections of future conditions as a basis for remedial action. Global problems do not necessarily require global solutions, and most corrective action will probably have to be taken at the national, regional, and local levels, but societal values will need to be reassessed in any attempt to resolve the conflict between economic activity and its environmental effects.

10765 APTIC NO. 28485

Israel, Hans

TRACE GASES AND AEROSOLS IN THE ATMOSPHERE.

(Spurengase und Schwebstoffe in der Luft). Text in German. Naturw. Rundschau, 20(8):329-336, Aug. 1967. 11 refs.

The trace gases in the atmosphere at 0 deg C and 760 mm pressure occupy 0.0004 of its volume and include helium, neon, krypton, xenon, hydrogen, ozone, carbon dioxide, carbon monoxide, methane, formaldehyde, nitric oxide, nitrogen dioxide, ammonia, sulfur dioxide, hydrogen sulfide, chlorine, and iodine. The proportion of the volume of the rare gases is constant, while the content of the other gases is subject to change. These gases are in a state of equilibrium between emission and elimination. Especially subject to change are ground level concentrations of SO2, NO2, NH3, and Cl2 Also present in the atmosphere are natural and artificial radioactive gases which are unstable. Aerosol particles include a wide range of sizes from molecules to precipitation particles, and originate from an exchange of substances between the surface of the earth and the atmosphere. A large part comes from combustion, from mineral and organic particles raised by the wind, and from ocean spray and wave crests. Aerosols also include a component of cosmic dust. Aerosol particles which can be observed by microscope are dust; those that cannot are condensation nuclei. The larger of these can still be observed by an ultramicroscope, but particles smaller than 0.1 micron cannot. As with trace gases, aerosols also are subject to cyclic processes which are governed by factors which create, move, change, and eliminate the aerosols. The purification process induced by clouds and precipitation, the chemical nature an the origin of aerosols, and self-purification of smog-laden air are discussed.

10766 APTIC NO. 28510

Organization for Economic Cooperation and Development, Paris (France) and Budesministerium fuer Gesundheitswesen (West Germany)

PROCEEDINGS OF THE SYMPOSIUM ON THE PHYSICO-CHEMICAL TRANSFORMATION OF SULPHUR COMPOUNDS IN THE ATMOSPHERE AND THE FORMATION OF ACID SMOGS.

Physico-Chem. Transformation Sulfur Compounds Atmosphere Formation Acid Smogs Proc. Symp., Mainz, West Germany, 1967, 92p. 54 refs. (Japan 8-9.)

The text is given of eight papers presented at the 1967 Symposium on the Physicochemical Transformation of Sulfur Compounds in the Atmosphere and the Formation of Acid

Smogs. The papers pertain to current research on atmospheric sulfur compounds and their transformations; the catalytic oxidation of sulfur dioxide in solution at concentrations occurring in droplets; a study of the ratio of sulfate: total sulfur and sulfuric acid in different meteorological conditions; the incorporation of sulfur dioxide into fog and rain droplets; the synthesis of particulate acid sulfate from the products of combustion of fuels and measurement of the acid sulfate from the products of combustion of fuels and measurement of the acid in polluted atmospheres; sulfur compounds in atmospheric dust; the hydrogen ion concentration of atmospheric aerosols; and sulfur compounds in urban air.

10767 APTIC NO. 28536

Cox, R. A. and S. A. Penkett

OXIDATION OF ATMOSPHERIC SO2 BY PRODUCTS OF THE OZONE-OLEFIN REACTION.

Nature (London), 230(5292):321-322, April 2, 1971. 17 refs.

The reaction between ozone and sulfur dioxide is too slow to be significant at atmospheric concentrations, but the reaction with unsaturated hydrocarbons is very rapid even at concentrations less than 1 ppm. Products of this reaction include a highly reactive species which has a strong germicidal and phytotoxic effect; it has been suggested that the active species is a peroxide zwitterion formed during the ozone-olefin reaction. Such a species, with a pronounced charge separation, should also be an effective oxidant for the conversion of SO2 to sulfur trioxide. Experiments which demonstrate such an oxidation were carried out in a 220 liter aluminum chamber. The reaction was started by injecting the required amount of liquid olefin into the venting air stream, where it vaporized before entering the chamber. The ozone-olefin reaction in the absence of SO2 followed second order kinetics and approximately equal amounts of ozone and olefin were consumed. Large amounts of aerosol, presumed to be sulfuric acid, were produced when SO2 was added to the mixture. The SO2 had no significant effect on the rate of disappearance of ozone or hydrocarbon but a small increase in the carbonyl product yields was observed. Rates of aerosol formation for four different olefins are presented tabularly, and they are much greater for the internally unsaturated olefins than for the terminally unsaturated propene.

10768 APTIC NO. 28582

Hanna, Steven R.

URBAN MICROMETEOROLOGY.

Preprint, American Nuclear Society, Hinsdale, Ill., 20p., 1969. 13 refs. (Presented at the American Nuclear Society Meeting, San Francisco, Calif., Dec. 4, 1969, Paper 35.)

The effects of urban areas on the atmosphere can be divided into th two broad areas of climatology and micrometeorology. The urban heat island, precipitation anomalies, and long-term humidity effects fall into the first category, while energy spectra alterations and diurnal variations of temperature gradients and turbulence fall into the latter category. On the assumption that a knowledge of temperature and wind speeds is sufficient to describe the distribution of all micrometeorological parameters, numerical techniques for estimating temperature gradients and the variation of turbulence parameters are presented.

10769 APTIC NO. 28586

Winchester, John W. and Robert A. Duce

THE GLOBAL DISTRIBUTION OF IODINE, BROMINE, AND CHLORINE IN MARINE AEROSOLS.

Naturwissenschaften (Berlin), 54(5):110-113, March 1967. 7 refs.

Atmospheric samples were analyzed for iodine, bromine, and chlorine by neutron activation analysis. Aerosols of marine origin, derived from sea spray, contained halogens in relative proportions different from sea water. Data from Hawaii and northern Alaska indicated fractionation of the elements both during transfer across the sea-air interface and by chemical reactions in the atmosphere. The ratio Br/Cl is usually severalfold greater in aerosols over land than in sea water; over open sea water, it is less. The ratio I/Br exhibits a greater degree of constancy than does I/Cl or Br/Cl, suggesting a long residence time and a coherence of I and Br in their movement as particulate material in the atmosphere. However, a singularly effective sea-air transfer mechanism for iodine is indicated by its generaly high atmospheric concentration compared to sea water. Bromine of pollution origin and associated with lead was observed in aerosols from Cambridge, Massachusetts. Chlorine and iodine concentrations in Cambridge are similar to the Hawaii values and provide a basis for resolving excess pollution bromine from the natural marine component. The ratio (excess Br)/Pb in aerosols appears to be correlated directly with the haziness of the air. (Author summary modified)

10770 APTIC NO. 28609

Tamura, Kunio and Shinichi Nomoto

FORECASTING METHOD OF SO2 BY MULTIPLE REGRESSION EQUATIONS DEVELOPED BY SCREENING PROCEDURE.

(Jukaikishiki (senbetsuho) ni yoru SO2 no yosoku). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):216, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

Multivariate statistical analysis was performed on the relationship between meteorological data, such as atmospheric pressure patterns, wind speed, and atmospheric stability, and sulfur dioxide levels up to 10 hrs after the meteorological measurements. By feeding a forecasting equation to an electronic computer and giving it the meteorological data inputs, the concentration of SO2 several hours hence can be predicted. The forecasting equation was constructed by means of screening procedures, which assume that the factor to be predicted can be expressed as a linear polynominal equation of the meteorological factors, and that the coefficients for those factors can be calculated in order to maximize the multiple correlation coefficient. For the multiple regression equations, ten to 20 factors were optimal. Some of the factors taken into consideration were wind direction and speed, atmospheric pressure and temperature, dew point differential, stability, conversion, and relative vorticity. A total of 259 days were analyzed betweeen October 1965-March 1966 and October 1966- March 1967.

10771 APTIC NO. 28613

Ishida, Yasuhiko, Jiro Kondo, and Susumu Kotake

DIFFUSION OF AUTO EXHAUST ON THE STREET.

(Jidosha haishutsu gasu no doronai kakusan). Text in Japanese. Preprint, Japan Society of Mechanical Engineering, Tokyo, 4p., 1971. 2 refs. (Presented at the Japan Society of Mechanical Engineering, Annual Meeting, 48th, Chiba, Japan, April 2-6, 1971, Paper 1007.)

The Fick equation was employed as a basis for analyzing the diffusion of auto exhaust, and molecular diffusion was assumed to be small compared to turbulent diffusion. Wind velocity was considered only as a meteorological parameter. Buildings, street surfaces and other obstacles were represented as a space with diffusion coefficient as zero, facilitating the numerical computation. Wind velocity distribution was simulated by a vortex in a trapezoidal region in the uniform flow of ground wind. Coefficients of turbulent diffusion were optimized by comparing the calculated distribution of pollutants with the observed data. The basic diffusion equation was transformed to a finite difference one, which was integrated step by step on a computer. The result was good agreement with the wind tunnel experiment. The analysis was applied to carbon monoxide measurements at a traffic intersection. A good agreement was obtained. With better estimate wind velocity distribution and also diffusion coefficients, the present model can simulate the actual situation to any degree desired. More practical experience is concluded to be important. The present study is a part of a large project sponsored by the Japan Society of Mechanical Engineers, on air pollution due to auto exhaust.

10772 APTIC NO. 28616

Nogami, Junji, Tsuguo Mizoguchi, Hideyuki Nomoto, Yoshinori Ishikawa, and Akiko Miyao

AIR POLLUTION POTENTIAL FORECASTING.

(Taiki osen potensharu yoho n tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):219, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

When sulfur dioxide concentration continuity is made to correspond to air pollution potential, the positions of migratory anticyclones and extra-tropical cyclones that appear in western Japan between late autumn and winter are of interest. A method is described whereby air pollution potential can be determined, with the aid of computer, from the forecasting weather map published by the Meteorological Agency. Criteria for a day of high potential pollution are as follows: Osaka is within 6 mb from the center of the anticyclone; atmospheric air pressure differential is within 6 mb in the region 30-40 N, 130-140 E; a cold front is closing in fro the Sanin area; a stationary front exists north of 30 N; and Osaka is between two cyclones. Similar qualifications are given for days of low potential and intermediate potential. A test run based on sets of data obtained at 9 am of the day prior to the forecast showed that for most cases, the accuracy was over 80%.

10773 APTIC NO. 28658

Carpenter, S. B., Jack M. Leavitt, William C. Colbaugh, and Fred W. Thomas

PRINCIPAL PLUME DISPERSION MODELS TVA POWER PLANTS.

Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 23 p., 1970. 7 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 63rd, St. Louis, Mo., June 14-18, 1970, Paper 70-149.)

Principal plume dispersion models were determined after 20 years of field study and documentation of dispersion from power plants over a varied range of unit sizes, stack heights, and meteorologica conditions. As unit sizes increase and stacks become taller, the plume dispersion model associated with maximum surface concentrations changes. Maximum concentrations for principal plume dispersion models were approximately equal for the small plants. However, the coning model was considered the critical model because its frequency of recurrence was appreciably greater than other models. As unit sizes and stack heights increased the magnitude of the maximum surface concentrations from the coning model decreased and the magnitude of concentrations from the inversion breakup model increased. However, with plumes from newer and larger units with higher stacks, the limited mixing model became prominent. Finally, with unit size increase to 900 mw and stack height increase to about 245, the magnitude of surface concentrations associated with limited mixing increased to such a degree that it became the critical dispersion model identified with power plants of this size.

10774 APTIC NO. 28665

Friedman, Howard A., Frank S. Cicirelli, and William J. Freedman

THE ESSA RESEARCH FLIGHT FACILITY: FACILITIES FOR AIRBORNE ATMOSPHERIC RESEARCH.

ESSA T.R. ERL 126-RFF 1, 89p., Aug. 1969. 14 refs.

This is the first of a series of reports describing the services of the Environmental Science Service Administration (ESSA) Research Flight Facility (RFF), an organization that provides airborne measurements in support of meteorological research programs. The history of the RFF is reviewed and its aircraft, logistical support requirements, navigational and operational practices, and communications capabilities are described. Flights made in support of various research programs are summarized. (Author abstract odified)

10775 APTIC NO. 28670

Marshall, James M.

A RADIO ACOUSTIC SOUNDING SYSTEM FOR THE REMOTE MEASUREMENT OF ATMOSPHERIC PARAMETERS.

Stanford Univ., Calif., Radioscience Lab., Contract AF 19(628)-6152, Proj. 8628, Task 862808, Unit 86280801, Rept. SU-SEL-70-050, A.F. Rept. AFCRL-70-0438, 139p., Aug. 1970. 18 refs.

NTIS, DDC: AD 712352

A technique for the remote measurement of wind velocity, turbulence, and air temperature is presented. Regions of the atmosphere are remotely sensed using velocity information obtained via coherent scattering of electromagnetic energy from an acoustic wave traveling through the atmosphere. The fundamental scattering relations are derived for a non-turbulent atmosphere. Scattering relations for the effect of wind and temperature gradients on system performance are also derived. The basic considerations involved in the design oof a Radio-Acoustic Sounding System termina are discussed. An experiment performed to verify the scattering relations derived and to determine the limitations imposed by a turbulent atmosphere is described. Usable signal-to-noise ratios were obtained reliably to scattering heights of 1.5 km. (Author abstract)

10776 APTIC NO. 28685

Bryant, L. W. and C. F. Cowdrey

EFFECTS OF VELOCITY AND TEMPERATURE OF DISCHARGE ON THE SHAPE OF SMOKE PLUMES FROM A FUNNEL OR CHIMNEY: EXPERIMENTS IN A WIND TUNNEL.

Proc. Inst. Mech. Engrs. (London), vol. 169:371-399, 1955. 8 refs. (Presented at the Institution of Mechanical Engineering, London, Great Britain, Feb. 11, 1955.)

A simple jet discharged at right angles to a uniform wind current was studied. A method of computing the course of the plume, given the temperature and velocity of discharge and the wind speed, is suggested, starting where model data stop and proceeding to regions where the dimensions of the chimney no longer influence the spread of the smoke. In these regions the path of the smoke depends primarily on atmospheric conditions and the height of the chimney. The effects of chimney height and diameter and of washing as against discharging hot gas, are discussed. It is concluded that for cold plumes, all practical conditions can be covered in a model experiment by varying the relative velocities of wind and affluent. To allow for the influenceof heat, no direct experiment appears to be possible on a scale small enough to be truly representative of conditons corresponding to any wind tunnel model. An allowance for the effect of turbulence which is different from that in the wind tunnel is deducible, in the case of cold plumes, from the effect of varying speeds in the wind tunnel experiments.

10777 APTIC NO. 28704

Ishi, Taro, Jiro Kondo, Tsuneomi Yano, and Susumu Kotake

DIFFUSION OF AUTO EXHAUST.

(Jidosha hiashutsu gasu no kekusan). Text in Japanese. Preprint, Japan Society of Mechanical Engineering, Tokyo, 4p., 1971. (Presented at the Japan Society of Mechanical Engineering, Annual Meeting, 48th, Chiba, Japan, April 2-6, 1971 Paper 1008.)

The diffusion equation was expressed with nondimensional variables; the subject space was divided with 50 grid points in x-direction, 30 in y-, and 20 in z-direction. The finite-difference method was employed for the numerical integration. Between the two methods of solution (one of solving elliptic equation and the other of assuming initial concentration of pollutant and solving parabolic equation), the latter was found to converge faster than the former. Wind velocity was assumed to be proportional to the seventh power of the height from the ground. Wind direction was chosen as one of the 16 prescribed directions. The lower layer of the atmosphere was assumed to be adiabatic and the component of turbulent shear stress parallel to the ground to be independent of the height. Square grids of the 10 by 10 sq m were drawn on the map and the average height of the buildings in each mesh was taken as the height of the building on the grid point. On each grid point on the street, the amount of exhaust was designated. On the basis of these data, the diffusion equation was solved. Observation of carbon monoxide distribution were made at a busy traffic intersection in Osaka City. Good agreement was obtained between the computed and observed values. The numerical analysis was obtained between the computed and observed values. The numerical analysis is concluded to well represent the diffusion phenomena as long as no chemical change in the pollutant occurs. The present study is a part of a large project on air pollution due to auto exhaust.

10778 APTIC NO. 28789

Komatsu, Susumu and Misao Hirayama

THE MEASUREMENT OF AN EFFECTIVE HEIGHT OF A CHIMNEY WITH LASAR RADAR.

(Reiza reda ni yoru yuko entotsu kodo no sokutei). Text in Japanese. Kogai to Taisaku, (J. Pollution Control), 7(3):241-248, March 1971. 4 refs.

Using laser radar equipment designed for mobile use, the atmospheri behavior of smoke was observed with respect to cross section of smoke current in the leeward; some examples of effective height of chimneys measured by the laser radar under different meteorological conditions are presented. The cross section referred to is a cross-sectional area obtained by sectioning the smoke current at a right angle to wind direction. One example it obtained at 481 m leeward from the smoke source is shown. The relationship between leeward distance and smoke elevation is shown in several diagrams, together with those showing wind velocity at different altitudes at the time of the observation. Further analyses of the data are required to derive new 'plume rise' theories or to make comparison with existing 'plume rise' theories. However, it is confirmed that effective chimney height and diffusion width can be observed by means of the Mie diffraction of laser wave, while Raman diffraction of laser rays can be applied to direct remote measurement of density of pollutants of discharged smoke. Block diagrams and main specifications of the laser radar used are presented. Methods for analyzing smoke density distribution through application of a lasar radar are also discussed at some length. Included are equations for calculating various factors involved in measurement by the lasar radar.

10779 APTIC NO. 28794

McKay, H. A. C.

THE ATMOSPHERIC OXIDATION OF SULPHUR DIOXIDE IN WATER DROPLETS IN PRESENCE OF AMMONIA.

Atmos. Environ., 5(1):7-14, Jan. 1971. 9 refs.

The kinetics of the conversion of ammonia and sulfur dioxide to ammonium sulfate in water droplets in the atmosphere in the absence of metal ion catalysts was reconsidered in a series of computer calculations. The reaction is an order of magnitude faster than earlier work suggested; lowering the temperature increases the rate by a large factor. In a cloud or a thick mist, appreciable amounts of ammonium sulfate, may be formed in a few minutes; nevertheless, a substantial proportion of unreacted ammonia may sometimes persist for hours, even though excess sulfur dioxide is present and the initial reaction is fast. (Author abstract)

10780 APTIC NO. 28799

Machta, L., R. J. List, M. E. Smith, Jr., and H. Oeschger

USE OF NATURAL RADIOACTIVITIES TO ESTIMATE LARGE-SCALE PRECIPITATION SCAVENGING.

Battelle Memorial Inst., Richland., Wash., Pacific Northwest Lab. and Atomic Energy Commission, Washington, D. C., Fallout Studies Branch, Precipitation Scavenging Proc. Symp, Richland, Wash., 1970, p. 465-474. 22 refs. (June 2-4.)

Beryllium-7 and argon-37 are naturally occurring cosmogenic radionuclides with similar half-lives. Relative productions as a function of altitude and latitude are identical. Beryllium-7 is subject to precipitation scavenging; argon-37, a noble gas, is not. A one-dimensional vertical diffusion model produces surface-air concentrations to fit the few surface-air Ar(37) measurements. Scavenging is added to the diffusion model to compare predictions with the observed Be(7) vertical profile. The diffusion-scavenging model can also be tested against the distribution of lead (210) resulting from the decay of radon gas emitted from the earth's surface. The technique promises to provide useful information on large-scale precipitation scavenging.

BASIC SCIENCE AND TECHNOLOGY

10781 APTIC NO. 27882

Wu, J. C., H. M. McMahon, D. K. Mosher, and M. A. Wright

EXPERIMENTAL AND ANALYTICAL INVESTIGATIONS OF JETS EXHAUSTED INTO A DEFLECTING STREAM.

Preprint, American Inst. of Aeronautics and Astronautics, Lancaster, New York and American Helicopter Soc., New York, 14p., 1969. 13 refs. (Presented at the American Institute of Aeronatuics and Astronautics/American Helicopter Society VTOL Research, Design, Operations Meeting, Atlanta, Ga., Feb. 17-19, 1969, AIAA Paper 69-223.)

A circular jet issuing normally from an infinite flat plate into a deflecting stream is treated by the use of a potential flow model representing the flow field surrounding the jet, exclusive of the wake. The results indicate that the entrainment of the deflecting- stream fluid into the jet is important in determining pressure and that, for the case where the jet speed is much higher than the deflecting-stream speed, it is possbile to use a two-dimensional representation. The calculated plate pressure distribution is compared with results of experiments. Experimental results (flow visualization, plate pressure, and velocity measurements) are presented for circular as well as noncircular jets exhausting at various jet velocities from a large flat plate. Results indicate that a streamwise jet exit configuration is desirable. (Author abstract modified)

10782 APTIC NO. 27967

Hrbac, Jan and Jiri Jiskra

A NEW METHOD FOR THE PRODUCTION OF SILICON DIOXIDE AEROSOL.

(Neue Methode zur Herstellung eines Siliziumdioxid-Aerosols). Text in German. Staub-Reinhalt. Luft, 31(1):18-21, Jan. 1970. 9 refs.

A new method produces finely dispersed silicon dioxide aerosol by burning monosilan obtained in the laboratory by the decomposition of magnesium silicide. The monosilan mixed with carbon dioxide is fed into a simple glass burner and produces a self igniting flame which generates white smoke resembling cigarette smoke which can be intercepted by a membrane ultrafilter. The method yields a monodisperse aerosol of silicon dioxide with particles of almost spherical shape. The method makes possible the regulation of the aerosol particle concentration by dosing the gaseous raw material which is more exact and easier than doing so by means of various sprayers. The method is suitable for use in the study of aerosols and for the testing of various filter materials.

10783 APTIC NO. 27981

Slanger, Tom G. and Graham Black

THE CO2 PHOTOLYSIS PROBLEM.

J. Chem. Phys., 54(1):1889-1898, March 1, 1971. 34 refs.

The photolysis of carbon dioxide was investigated at 1470 A to determine the O(1D) quantum yield and the subsequent O (3P) yield resulting from O(1D) deactivation, the O(1D)-CO2 interaction rate constant, and the possible role of CO2 in the overall process. With the 1302-1306 A OI triplet utilized as a resonance fluorescence source, O(3P) atoms were monitored during O2 and CO2 photolysis. By measuring both the intensity and decay time constants for the fluorescence, it was concluded that each photon absorbed by CO2 ultimately resulted in an O(3P) atom. This observation suggests that all previous determinations of low O2/CO2 ratios in CO2 photolysis relate to effects taking place after production of O(3P) and that wall absorption of O(3P) is probably the dominant process. By utilizing competitive quenching between CO2, H2, and N2, it was determined that the O(1D) quantum yield is unity, and that the rate constant ratio for O(1D) deactivation by N2 and CO2 is 0.26, in excellent agreement with other investigations, giving a CO2 rate constant of 3 plus or minus 1 times 10 to the minus 10th power cu cm reciprocal molecule reciprocal sec. Attempts to find effects attributable to CO2 participation in the system were unsuccessful, and the implications for planetary atmosphere models are discussed. (Author abstract modified)

10784 APTIC NO. 27982

Rosenberg, C. W. Von, Jr., R. L. Taylor, and J. D. Teare

VIBRATIONAL RELAXATION OF CO IN NONEQUILIBRIUM NOZZLE FLOW, AND THE EFFECT OF HYDROGEN ATOMS ON CO RELAXATION.

J. Chem. Phys., 54(5):1974-1987, March 1, 1971. 42 refs.

The vibrational relaxation of carbon monoxide was studied under conditions of rapid nonequilibrium expansion by using a shock tunne to generate a nozzle flow with stagnation temperatures and pressure of 2000-4500 K and 5-15 atm, respectively. The vibrational temperature of the CO in the supersonic region of the nozzle was obtained from measurements of the first overtone emission at 2.3 micron by using a calibrated infrared detection system. From these data it was determined that the relaxation time of the CO inferred from the expansion experiment is, at most, 5 times smaller than the relaxation time measured behind incident shock waves. Thi factor of 5 is in sharp disagreement with previously published measurements in CO and nitrogen which quote factors from 70 to 1000, impying anomalously fast de-excitation of vibration in expanding flows, but is in agreement with other subsequently obtained measurements. Impurities were found to be more important in this type of experiment than in measurements of relaxation time behind incident shock waves mainly because of additional ways of their getting into the flow. Hydrogen atoms were found to have a probability per collision for the de-excitatio of CO equal to 0.01 to 0.3 for the temperature equal to 1400-2800 K It is not certain whether the observed factor of 5 for pure CO is due to residual impurity effects or due to effects of anharmonicity as discussed in recent theories. (Author abstract)

10785 APTIC NO. 27990

Gammon, R. H., R. C. Stern, and W. Klemperer

MOLECULAR-BEAM ELECTRIC-RESONANCE SPECTROSCOPY OF THE ALPHA 3 PI (V EQUALS O) TO ALPHA PRIME 3 SIGMA (V PRIME EQUALS O) PERTURBATION IN CARBON MONOXIDE.

J. Chem. Phys., 54(5):2151-2163, March 1, 1971. 54 refs.

The heterogeneous perturbation of the a 3 pi (v equals 4) state of CO by the nearly degenerate a prime 3 sigma + (v prime equals 0) state is observed in the rf electric-dipole spectrum of the metastable a 3 pi (v equals 4) state. Perturbed lambda doublings and Stark effects have been measured in molecular-beam electric resonance from 7-400 MHz. These measurements are combined with existing optical data to obtain the off-diagonal matrix elements of the fine structure which describe the a-a' interaction, and the diagonal components of the dipole moment. This last quantity is identically the electronic transition moment of the prime a prime 3 sigma a 3 pi Asundi system. (Author abstract)

10786 APTIC NO. 28002

Takeuchi, Nobuhiko

STUDY OF THE ABSORPTION OF SULFUR DIOXIDE IN WATER BY LIQUID JET.

(Ekichuto niyoru SO2 in kyushu nitsuite). Text in Japanese. Hiroshima Daigaku Kogakubu Kenkyu Hokoku (Bull. Fac. Eng., Hiroshima Univ., 10(1):41-47, July 1971. 12 refs.

Based on the fact that a liquid jet from a bell-shaped nozzle show an equivalent velocity distribution both inside the jet and on the surface, the diffusion coefficient of the physical absorption of sulfur dioxide in water at 30 C was measured. The SO2 was obtained from a commercial gas bomb and passed through a soap bubble flow meter and saturator to an absorption chamber. Temperature and pressure were controlled by a thermostat and manometer, respectively, the excess gas being processed by a wet column tower. The absorption water at controlled temperature was pumped to a tank, from which it flowed down to a nozzle of 0.11-0.06 cm inner diameter to form a jet 2 cm in length. The jet absorbed SO2 while contacting the gas for 0.029 0.17 sec. After absorption, the solution was led to a liquid level controller and subsequently to a receiver. The absorbed SO2 was analyzed by potential-difference titration with potassium permanganate in a weak-alkaline solution. Since the measurement was made in an unsteady state diffusion, the measured values were converted to dimensionless terms of steady-state diffusion. A formula was obtained expressing the Sherwood number in terms of Reynolds and Schmidt numbers. The coefficient in the formula was a little greater than that of Linton and Sherwood, but a good agreement with Scheibel's result was obtained. The present method is useful for measuring the diffusion coefficient of a gas-liquid system, which is difficult to handle because of convection.

10787 APTIC NO. 28025

Commoner, Barry

BALANCE OF NATURE.

In: Providing Quality Environment in Our Communities. Ward W. Konkle (ed.), Washington, D. C., Graduate School Press, Dept. of Agriculture, 1968, p. 37-62. 11 refs.

The effects of technological intrusion into the natural nitrogen cycle are examined. In a balanced natural system, soil is rich in organic nitrogen and capable of supporting efficient absorption of nutrients by plants growing in it. Only small amounts of inorganic nitrogen nutrients are drained off into waters, which remain clear and unburdened by pollutants. Stable, inert nitrogen gas dominates the air habitat in nature, so air is clean and innocuous to man and animal. Currently, about 0.9 million tons of nitrogen reach surface waters each year from agricultural sources, where they join about 0.6 million tons of nitrogen generated by municipal wastes. At the same time, approximately 0.9 million tons of nitrogen appears to enter the air annually from agricultural sources, where they join about 2.5 million tons of nitrogen produced annually by power plants and automotive transport. This intruded nitrogen is causing biologically undesirable increases in the nitrate content of food and of the nitrogen oxides in urban air. It also contributes, through eutrophication, to the deterioration of the self-purifying cycles in surface waters. Ecosystems operating in air, water, and soil have failed to adopt to these large-scale intrusions with the result that the balance of nature is threatened.

10788 APTIC NO. 28040

Wayne, Lowell, Roy Danchick, Mel Weisburd, Al Kokin, and Arnold Stein

MODELING PHOTOCHEMICAL SMOG ON A COMPUTER FOR DECISION-MAKING.

Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 22p., 1970. 4 refs. (Presented at the Air Pollution Control Association Annual Meeting, 63rd, St. Louis, Mo., June 14-18, 1970, Paper 70- 18.)

A Photochemical/Environmental Simulation Computer Based Model was designed and constructed to provide a powerful decision-making tool for air pollution control agencies in the 1970's. This computer program system may be utilized to simulate the effect of various control policies on urban photochemical pollution, both for the determination of abatement strategies and for the training air pollution control personnel. The basic physical concept underlying the Photochemical/Environmental Simulation Model is the process of evolution of photochemical pollution in a parcel of air as it moves in a dynamic urban emission/meteorological environment along a give urban wind trajectory. Both the photochemical evolution and the trajectory are numerically integrated by a standard linear multistep predictor-corrector method. Concentrations of photochemical reactants and products (such as primary and secondary contaminants) are determined by this numerical integration, which also includes appropriate terms for the following effects: time variation in mixing height along the parcel trajectory; the presenc of stationary (stack) sources and time-distance-varying pollution concentrations due to diffusion effects and trajectory motions of the air parcel; the presence of time-varying traffic emission sources in the neighborhood of the parcel; and the relation of reaction rates of photochemical pollutants to diurnal fluctuations of ultraviolet radiation and cloud cover. The photochemical evolution of concentrations within a parcel of air is simulated by differential equations containing rate terms for each of the reactions in a plausible photochemical mechanism. These rates are summed and input to the numerical integration subroutine along with a parcel velocity interpolated from wind data at fixed stations. (Author abstract modified)

10789 APTIC NO. 28045

Briner, E., S. Nicolet, and H. Paillard

OZONIZATION OF SULFUROUS ACID AND SULFUR DIOXIDE. EFFECT OF OZONE ON THE PARTICIPATION OF OXYGEN IN THE OXIDATION.

(Sur l'ozonation de l'acide et de l'anhydride sulfureux. Action de l'ozone sur la participation de l'oxygene a l'oxydation). Text in French. Helv Chim. Acta, vol. 14:804-810, 1931. 5 refs.

Results of a study of ozonization of benzoic aldehyde indicated tha this process involved oxidation as well, the extent of which was determined by the amount of ozone involved in the ozonization. The present study served to establish whether a similar phenomenon occurs during ozonization of sulfurous acid and of SO2. Ozonized oxygen was used with 0.6 to 3.3 volume % ozone. Gaseous SO2 was obtained by evaporation of liquid SO2 contained in an ice-cooled ampul. Mixtures of dried ozonized O2 and SO2 were circulated at various rates of flow through the work tube of the apparatus and, then either absorbed by water or condensed in an ampul cooled by a dry ice-alcohol mixture. Ozonization of sulfurous acid gave oxidation yields, computed on the basis of ozone consumed in the reaction, which exceeded 100%, indicating an effect of ozone on the participation of O_2 in the oxidation process. This effect was strongly influenced by the O_3 content of the oxygen-ozone mixture. An optimal content of about 1% O_3 resulted in an oxidation yield of nearly 200%. This phenomenon is explained in terms of sulfurous acid as an auto oxidant and in terms of a 'theory of active molecules' proposed in a preceding paper. In the absence of water, SO_2 and O_3 react with each other at a very low rate.

10790 APTIC NO. 28051

Miyahara, Sadao and Hitoshi Takahashi

BIOLOGICAL CO EVOLUTION: CARBON MONOXIDE EVOLUTION DURING AUTO- AND ENZYMATIC-OXIDATION OF PHENOLS.

J. Biochem., 69(1):231-233, 1971. 11 refs.

Data are reported for the amounts of oxygen consumed and carbon monoxide evolved during the autoxidation of various phenols in sodium hydroxide and during the enzymatic oxidation of L-DOPA with active or inactivated mammalian tyrosinase. The source for the CO produced by oxidation of the phenols was determined to be the carbon in the structure of the phenols rather than the carbonate present in potassium hydroxide. The CO produced by the enzymatic oxidation of L-DOPA indicates that the oxidative degradation of heme is not the only source for endogenous CO.

10791 APTIC NO. 28054

Field, D. S. and M. J. Newlands

SULPHUR DIOXIDE REACTIONS OF METAL CARBONYLS AND CYCLOPENTADIENYL METAL CARBONYLS CONTAINING METAL-METAL BONDS.

J. Organometal. Chem., 27(2):221-230, 1971. 24 refs.

The reactions between sulfur dioxide and the following metal carbonyls containing metal-metal bonds are reported: diiron nonacarbonyl, triiron dodecarbonyl, dicobalt octacarbonyl, bis(tricarbonyl(triphenylphosphine) cobalt), bis(dicarbonyl-pi-cyclopentadienyliron), dimanganese decacarbonyl, bis (tricarbonyl-pi-cyclopentadienylmolybdenum). Only the compounds containing bridging carbonyl groups were found to react under the experimental conditions. Diiron nonacarbonyl gave, in addition to the previously reported $Fe_2(CO)_8SO_2$, iron pentacarbonyl in comparable yield. Two crystalline isomeric compounds were obtained from bis(dicarbonyl-picyclopentadienyliron) and sulfur dioxide. Structures for these isomers are proposed on the basis of infrared spectra. (Author abstract modified)

10792 APTIC NO. 28076

Trust, D. B. and Fred Kurata

VAPOR-LIQUID AND LIQUID-LIQUID VAPOR PHASE BEHAVIOR OF THE CARBON MONOXIDE-PROPANE AND THE CARBON MONOXIDE-ETHANE SYSTEMS.

Am. Inst. Chem. Engrs. J., 17(2):415-419, March 1971. 8 refs.

Low temperature vapor-liquid phase data are reported for the carbon monoxide-propane and the carbon monoxide-ethane systems. Data for the former system are reported at eight temperatures ranging from -125 to 50 C, with pressures up to 2000 lb/sq in. abs., while data for the carbon monoxide-ethane system are reported for four temperatures from -100 to O C, with pressures up to the critical locus. Liquid-phase immiscibility was observed at low temperatures in both systems. Pressure-temperature loci for these two systems in liquid-liquid vapor equilibrium are noted. Since the two liquid phases become identical at the critical point for the carbon monoxide-ethane system, the critical solution point of this system differs from that of the carbon monoxide-propane system in which the carbon monoxide-rich liquid becomes identical with the vapor phase. In the carbon monoxide-ethane system the carbon monoxide-rich liquid is more dense than the ethane-rich liquid over the entire three-phase region. (Author abstract modified)

10793 APTIC NO. 28104

Kimura, Nonio and Koichi Iinoya

PRESSURE DROP OF A FIBROUS MAT FILTER WITH DUST LOADING.

(Funjinfuka o tomonau senijyutenso filuta no aturyoku sonsitu). Text in Japanese. Kagaku Kogaku (Chem. Eng.), 33(12):1255-1260, Dec. 1969. 8 refs.

The character of the pressure drop of a fibrous mat filter with adhering particles is generally larger than that which has been determined for a clean fibrous filter. The equation relating the collected dust loading and the pressure drop can be derived by assuming that the diameter of a fiber is made uniformly larger by particles adhering to its surface. The correlation between the porosity of the collected particle layer and operating conditions i found from experimental values of pressure drop with dust loading. In an equation for collection efficiency, the pressure drop of a fibrous mat filter with dust loading can be represented as the function of particle density and filtration time. Thus, the pressure drop across a fibrous mat filter can be estimated for any filtration period. If the pressure drop of a fibrous mat filter with dust loading depends on the diameter of a fiber uniformly enlarged by dust, the increase in pressure drop with dust loading is represented by the porosity of the filter and the apparent porosity of the dust loading. This apparent porosity is the function of particle density, collected dust loading, and the mean volume fraction of collected particles. The collected dust loading on a fiber at any time is given by the function of dust density and the filtration time in the equation for collection efficiency. The mean volume fraction of collected particles is calculated from experimental values and given within a 20% deviation in the range of critical dust load.

10794 APTIC NO. 28131

Saegusa, Takeo, Tetsuo Tsuda, and Yo Isegawa

CARBAMOYL CHLORIDE FORMATION FROM CHLORAMINE AND CARBON MONOXIDE.

J. Org. Chem., 36(6):858-860, 1971. 4 refs.

Results are reported for the carbonylation of N-chlorodimethylamine other dialkylchloramines, and monoalkylchloramines. Yields of carbamoyl chlorides are noted for various catalyst systems, carbon monoxide pressure, various solvents, and different reaction temperatures. Carbamoyl chloride formation from chloramine and carbon monoxide proceeded in the presence of palladium metal, palladium chloride, or rhodium trichloride catalyst. Metallic copper, silver, and nickel, as well as potassium chloroplatinate were not effective under the reaction conditions of the study.

10795 APTIC NO. 28150

Kukhar, V. P.

REACTIONS OF PHOSPHORIMIDIC TRICHLORIDES WITH HYDROGEN CHLORIDE AND SULFUR DIOXIDE.

J. Gen. Chem. USSR (English translation from Russian of: Zh. Obshch. Khim.), 40(4):761-763, April 1970. 5 refs

The ability of phosphorimidic trichlorides to react with hydrogen chloride depends on their basicity, which is determined by the electronegativity of the substituents X on the nitrogen atom. Phosphorimidic trichlorides in which the substituent X was strongly electronegative remained unchanged under the simultaneous action of hydrogen chloride and sulfur dioxide at 20-25 deg for 8-10 hr. O-chlorophenylphosphorimidic trichloride reacted with formation of o-chlorophenylphosphoramidic dichloride. Aryl- and alkylphosphorimidic trichloride dimers also reacted with a mixture of hydrogen chloride and sulfur dioxide. In the reactions cleavage of the N-P bond occurred, and N,N'-diaryl- and N,N'-dialkyl-N-(dichlorophosphinyl) phosphorodiamidic chlorides were formed.

10796 APTIC NO. 28151

Borst, Walter L. and Edward C. Zipf

LIFETIMES OF METASTABLE CO AND N2 MOLECULES.

Phys. Rev., 3(3): 979-989, March 1971. 24 refs.

The average lifetime of metastable carbon monoxide molecules in the a(3)Pi state excited by impact at 7.5 eV at room temperature was about 1 msec. Lifetimes of metastable N2 molecules in the a(1)Pi g and E(3) Sigma g(+) states were 115 plus or minus 20 and 190 plus or minus 30 microsec, respectively. There was evidence for at least one higher-lying metastable state of CO at about 10 eV having a lifetime of about 0.1 msec. The lifetimes were obtained in a time-of-flight experiment and deduced from the measurements without resorting to analytic expressions of the time-of-flight distributions. The observed time-of-flight distributions were essentially Maxwellian. A diffuse-gas source operated at pressures in the 0.0001 torr range was used. Effects due to metastable recoil, ultraviolet photons from metastable decay, and metastable wall collisions were carefully examined and found to be negligible under most conditions. Metastable excitatio functions were obtained by means of a low-energy high-resolution electron gun. These techniques can yield lifetime values from below 0.0001 sec to larger than 0.01 sec. (Author abstract modified)

10797 APTIC NO. 28152

Plekhotkin, V. F.

SECOND VIRIAL COEFFICIENTS OF NITROGEN OXIDES.

Russ. J. Phys. Chem. (English translation from Russian of: Zh. Fiz. Khim.), 44(8):1156-1157, 1970. 19 refs.

The force constants of the 6-12 Lennard-Jones intermolecular potential were used to calculate the second virial coefficients for pure dinitrogen tetroxide and nitrogen dioxide and for an equilibrium mixture of the oxides over the range 265-320 K. The fugacities of the components of the equilibrium mixture were then computed. At the temperature considered, the maximum difference between partial pressure and fugacity is 4.3%, 0.5%, and 2.8% for dinitrogen tetroxide, nitrogen dioxide, and the equilibrium mixture, respectively, the discrepancy increasing with rise in temperature. With rise in temperature, the absolute value of the second virial coefficient apparently decreases by a considerably smaller amount than that by which the pressure increases. An equation of state containing the second virial coefficient reproduces experimental pressure-volume-temperature data for the N2O4-NO2 system more accurately than the equation of state for an ideal gas. (Author abstract modified)

10798 APTIC NO. 28232

Pao, Yoh-Han and P. M. Rentzepis

LASER-INDUCED PRODUCTION OF FREE RADICALS IN ORGANIC COMPOUNDS.

Appl. Phys. Letters, 6(5):93-95, March 1, 1965. 5 refs.

The polymerization of styrene and of p-isopropylstyrene is reported photoinitiated with radiation from the ruby laser in the absence of photosensitizers and oxygen. A pyrex cell containing 9 g of distilled styrene monomer was evacuated and immersed in a dewar containing liquid nitrogen. The output of a pulsed ruby laser was passed through a Corning CS2-58 filter to eliminate ultraviolet radiation from the filtered beam and was subsequently focused onto the sample cell. After being subjected to 20 pulses of the focused output, the sample was removed from the liquid nitrogen and allowed to reach room temperature, after which methanol was added and the resulting precipitate was extracted. Actually styrene absorbs very little at 3470 A, and in so far as two-photon processes are concerned it would seem that monomers with higher absorbance at that wavelength would be more suitable. In support of this hypothesis it was found that considerable polymerization could be achieved for para-isopropylstyrene even though a partially focused beam and a smaller number of pulses were used. It is expected that other monomers which absorb at two-photon frequencies may also be polymerized in this manner.

10799 APTIC NO. 28260

Kabanov, M. V.

ATTENTUATION OF LIGHT SIGNAL IN A SCATTERING MEDIUM.

Sov. Phys. J. (English translation from Russian of: Izv. Vyssh. Ucheb. Zaved. Fiz.), 9(5):11-13, Sept.-Oct. 1966. 7 refs.

A quantitative assessement of effects due to the interference on waves scattered by an ensemble of particles is given. It is shown that in the propagation of a collimated beam of light in a turbid medium, interference effects give rise to an addition stretching of the scattering indicatrix for a single particle. The interference 'tongue' obtained is concentrated in a very small angle in the direction of the light beam incident on the particle system. Over a wide range of experimental conditions, this angle is of the order of a few minutes. (Author abstract)

10800 APTIC NO. 28263

Filippov, A. P. and G. I. Krutova

INTERACTION OF OXIDES OF NITROGEN WITH COMPONENTS OF THE EXTRACTION REAGENT--DILUENT SYSTEM.

Radiochemistry (USSR) (English translation from Russian of: Radiokhimiya), 11(5):527-531 Sept.-Oct. 1969. 18 refs.

The interaction of nitrogen oxides with n-octane, sulfurated kerosene, and carbon tetrachloride was investigated by infrared spectrometry. When an equimolar mixture of nitric oxide and nitrogen dioxide was contacted with saturated hydrocarbons, NO2 dissolved, then interacted with the hydrocarbons to form nitroparaffins, nitric esters, and probably nitrous acid. Dissolution of NO and NO2 without chemical interaction was observed in carbon tetrachloride. When nitrogen oxides were brought into contact with tributyl phosphate and Di-2-ethylhexylphosphoric acid in the presence of negligible amounts of water, molecular nitric acid and apparently, nitrous acid were formed. These interacted with the extraction agents, forming complexes. No destructive changes in the extraction reagents occurred under the influence of the nitrogen oxides. (Author conclusions modified)

10801 APTIC NO. 28278

Wilson, Wm. E., Jr., E. L. Merryman, Arthur Levy, and Harold R. Taliaferro

AEROSOL FORMATION IN PHOTOCHEMICAL SMOG. I. EFFECT OF STIRRING.

Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 20p., 1970. 11 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 63rd, St. Louis, Mo., June 14-18, 1970, Paper 70-112.)

The effect of various parameters on aerosol formation from individual compounds and simple mixtures was studied to establish operating conditions for an understanding of the relationship between gasoline composition and aerosol formation in the irradiate exhaust. Experiments were conducted in a 200 liter and a 610 cu ft smog chamber, while measurements were made with the Sinclair Phoenix forward scattering photometer and the integrating nephelometer. When no aerosol was formed from 1-heptene/nitric oxide plus nitrogen dioxide or 1,3,5-trimethylbenzene/NOx in the 200 liter chamber, it was discovered that stirring effected aerosol formation. No aerosol was observed during runs with normal stirring, while large amounts of aerosol were observed in runs with the fan off. If the fan was turned off after 20 minutes of irradiation, aerosol formation was delayed about 20 minutes although the maximum light scattering reading was almost the same. A small amount of light scattering was observed in stirred runs of the 1-butene/NOx/sulfur dioxide system, which indicates that the aerosol formed in the presence of SO2 is less sensitive to stirring than that formed in its absence. Apparently, convection circulation is adequate to maintain homogeneity after initial mixing. In the 610 cu ft chamber the following decreases in aerosol formation were observed by stirring at 218 rpm; toluene/NOx 73%; 1-heptene/NOx, 37%; SO2/clean air, 20%; 1-heptene/NOx/SO2, no change. The difference between stirring at 218 rpm and 1000 rpm is much less than the difference between 218 rpm and no stirring. Many of the early studies of aerosol formation need to be reinterpreted because the role of stirring was not recognized. Differences in sensitivity to stirring between olefins and aromatics, and between systems which do or do not contain SO2, account for many of the discrepancies in the literature with respect to aerosol formation.

10802 APTIC NO. 28290

Temkin, O. N., O. L. Kaliya, G. K. Shestakov, S. M. Braylovskiy, R. M. Fiid, and A. P. Aseyeva

INTERACTION OF HALOGENORGANIC COMPOUNDS AND CARBON MONOXIDE WITH OLEFINS IN A SOLUTION OF TETRAKIS(TRIPHENYLPHOSPHINE) PALLADIUM(O).

(Vzaimodeystviye galoidopranicheskikh coyedineniy s okisyu ugleroda i olefinami v rastoorakh titrakis (trifenilfosfin) palladiyo (O)). Text in Russian. Kinetika i Kataliz, 11(6):1592-1593, 1970. 10 refs.

Studies of conversions of vinylchloride and phenylbromide in PdL4 (L--P(C6H5)3) solution have demonstrated that Pd(O) complexes are suitable catalysts for reactions of halogenated organic compounds with CO, C2H2, C2H4, and other molecules.

10803 APTIC NO. 28292

Jung, J., O. Knacke, and D. Neuschuetz

THE SOLUBILITY OF CARBON MONOXIDE AND OF HYDROGEN IN WATER UP TO 300 C.

(Loeslichkeit von Kohlenmonoxid und Wasserstoff in Wasser bis 300 C). Text in German. Chem., Ing. Tech., 43(3): 112-116, Feb. 1971. 28 refs.

The solubility of carbon monoxide and of hydrogen in water was determined in an autoclave up to a temperature of 300 C and up to a total pressure of 100 atm corresponding to a molar fraction of the dissolved gas of up to 1.2 times 0.001. The reaction between the dissolved CO and water taking place above 250 C was considered in the determination of the solubility equilibrium. At gas contents exceeding or equalling 4 times 0.0001 mol, solubility isotherms can be approximated by straight lines whose inclines were expressed by solubility constants. At higher concentrations the isotherms manifested a curving which became more marked with increasing temperature. Thus the applicability of Henry's law as a practical approximation formula is limited to small gas contents, at least at higher temperatures.

10804 APTIC NO. 28308

Hippler H. and J. Troe

HIGH PRESSURE RANGE OF THE RECOMBINATION O + O2 YIELDS O3.

(Hochdruckbereich der Rekombination O + O2 ergibt O3. Text in German. Ber. Bunsenges. Physik. Chem., 75(1):27-32, Jan. 1971. 29 refs.

The quantum yield of the nitrogen dioxide photolysis of mixtures of nitrogen dioxide and oxygen in a nitrogen carrier gas was measured at room temperatures. From the quantum yield, the rate of recombination O + O2 yields O3 was derived. The transition of this recombination from a third order reaction to an almost complete second order reaction was observed by varying carrier gas pressure between 1-200 atm. Rate constants are given for both third and second order reactions, and those for the high pressure recombination are compared with rate constants of isotope exchange. Also compared are the different properties of the potential surfaces in the O3-, NO2-, and NO3-systems. (Author abstract modified)

10805 APTIC NO. 28353

Ault, J. W. and R. J. Ayen

CATALYTIC REDUCTION OF NITRIC OXIDE WITH VARIOUS HYDROCARBONS.

AIChE (Am. Inst. Chem. Engrs.) J., 17(2):265-271, March 1971. 17 refs. (Presented at the American Institute of Chemical Engineers Meeting, Washington, 1969.)

Conversion data for the reduction of nitric oxide with C1 to C8 hydrocarbons over a barium-promoted copper chromite catalyst were obtained in an integral flow reactor operated at atmospheric pressure and temperatures of 225 to 525 C. In general, an increase in carbon number in the hydrocarbon studied resulted in a decrease in the required temperature for a given nitric oxide conversion. For a given carbon number, the requried temperature for a given nitric oxide conversion decreased with degree of saturation. The data were fitted to empirical rate expressions. (Author abstract)

10806 APTIC NO. 28356

Ogata, Y. and H. Tezuka

PARTICIPTATION OF BOTH HNO2(+) AND NO2 IN NITRIC ACID OXIDATION. II BENZOIN IN 40% DIOXAN.

Tetrahedron, 26(23):5593-5599, Dec. 1970. 9 refs.

Benzoin was easily oxidized with 2.0 M nitric acid containing a small amount of nitrous acid in 40% dioxan at 90 deg. First order rate constants obtained are tabulated. The rate of oxidation was independent of both nitric and nitrous acid concentration, but enhanced by increased acidity of the solution. The plot of log k vs. Hf Sub o gave a straight line with a slope of ca -0.6, implying participation of both protonated nitrogen dioxide HNO2(+) and free nitrogen dioxide (NO2) as attacking species. The Arrhenius plot gives apparent activation energies (kcal/mol) of 10 for ka and 30 for kb, and kb corresponding to the attacks of HNO2(+) and NO2, respectively. The oxidation mechanism is discussed. (Author abstract modified)

10807 APTIC NO. 28380

McLaren, K. G.

RADIOLYSIS OF ACETYLENE-NITROUS OXIDE MIXTURES AND THE EFFECT OF CARBON DIOXIDE.

Int. J. Radiat. Phys. Chem., vol. 2:123-130, 1970. 16 refs.

Acetylene-nitrous oxide mixtures were irradiated to low dose levels (approximately 4.1 times 10 to the 10th power eV reciprocal g) with Co(60) gamma radiation. Nitrogen was formed, the yield increasing with increased nitrous oxide concentration to limiting values around 17 for nitrous oxide concentrations of 10-20%. There was a small yield of carbon monoxide, and the polyacetylene was oxygented. Addition of sulfur hexafluoride prevented formation of nitrogen, while addition of carbon dioxide to the actylene-nitrous oxide system reduced nitrogen yields. The results are explained on the basis of electron capture by nitrous oxide, followed by a short-chain process initiated by reaction of O(-)ions with acetylene. Estimated relative rate constants for the proposed mechanisms are given. Benzene was also formed. The fact that the initial yield was not affected by electron scavenging indicates that ion-neutralization reactions are not involved in the cyclization process. (Author abstract modified)

10808 APTIC NO. 28386

Buelow, Martin, Adreas Grossmann, and Wolfgang Schirmer

ADSORPTION GAS CHROMATOGRAPHIC DETERMINATION OF SEPARATING FACTORS OF BINARY MIXTURES OF THE HYDROCARBONS C1 TO C4 AND NITROGEN OF NACAA-ZEOLITE.

(Adsorptions-gas chromatographische Bestimmung von Trennfaktoren binaerer Gemische der Kohlenwasserstoffe C1 bis C4 und Stickstoff an NaCaA-Zeolith). Text in German. Chem. Tech. (Berlin), 23(1):33-34, Jan. 1971.

Separating factors for the adsorption at 105-272 C, of all possible binary mixtures of nitrogen, methane, ethane, propane, n-butene, ethylene, and propylene on a synthetic NaCaA zeolite (60% exchange Na(+) against Ca2(+) ions) were determined. The obtained data were compared with data from the literature. A good agreement was found. Analysis of the measured separating factors showed that the logarithm of the separating factor at constant temperature is approximately a linear function with the chain length lg alpha equal to a plus bn, where a and b are constants and n is the number of C atoms in homologous compounds of the n-paraffins and n-olefins. A dependence of the separating factor on the presence of pi-electrons was found. The influence of the specific interactions between pi-electrons and zeolitic cations on the separating factor is a function of the temperature.

10809 APTIC NO. 28414

Hauffe, Karl and Carl Wagner

THE THERMODYNAMIC ANALYSIS OF LIQUID STATE CURVES OF INTERMETALLIC COMPOUNDS.

(Ueber die thermodynamische Analyse der Liquiduskurven intermetallischer Verbindungen). Text in German. Z. Elektrochem., 46(3):160-170, 1940.

From measurements of the liquid state curve of intermediary crystals of binary alloy systems, equations are derived reflecting the dependence of chemical potentials of the liquid alloy phase on the concentration. The equations are used to evaluate the liquid state curves of crystals, of AuIn2, Ca3Bi2, Mg2Sn, Al2La, Al2 Pr and La2Sn. In a number of systems a steep rise of chemical potentials of the components occurs in the liquid alloy. The phenomenon is explained in some systems by an almost salt-like linkage as in Mg3 (2+) B2 (3-), Ca3(2+) Bi2(3-), and Mg2(2+)Sn(4-).

10810 APTIC NO. 28428

Chaix, Paulette and Claude Fromageot

THE EFFECT OF SODIUM FLUORIDE AND OF MONOIODACETIC ACID ON THE ANAEROBIC AND AEROBIC DECOMPOSITION OF SOME SUBSTRATES BY PROPIONIBACTERIUM PENTOSACEUM.

(Influence du fluorure de sodium et de l'acide monoiodacetique sur les degradations anaerobie et aerobie de quelques substrats par Propionibacterium pentosaceum). Text in French. Enzymologia, 7(5-6):353-361, 1939. 21 refs.

The effect of different concentrations of sodium fluoride and monoiodacetic acid on the anaerobic and aerobic metabolism of glucose, lactic, and pyruvic acid by Propionibacterium pentosaceum in a non-proliferating state was studied. At a concentration of 0.02 M, sodium fluoride completely inhibits the anaerobic decomposition of glucose and lactic acid but has only a weak effect on the anaerobic decomposition of pyruvic acid. At the same concentration the fluoride has practically no effect on the aerobic metabolism of the three substances other than to raise to one the respiratory quotient of glucose which in a phosphate medium is somewhat lower (0.85). Monoidacetic acid at a 0.0004 M concentration was found to completely inhibit glucose fermentation while its effect on the oxidation of the same substrate was relatively weak. The effect on the aerobic decomposition of lactic acid was practically nil even at a lactic acid concentration of 0.01 M.

10811 APTIC NO. 28455

Buyevich, Yu. A. and Yu. P. Gupalo

DISTORTION OF THE ENERGY SPECTRUM OF A DEGENERATING ISOTROPIC TURBULENCE UNDER THE INFLUENCE OF PARTICLES SUSPENDED IN LIQUID.

(Iskazheniye energeticheskogo spektra vyrozhdayushcheysya izotropnoy turbulentnosti pod vliyaniyem vzveshennykh v zhidkosti chastits). Text in Russian. Zh. Prikl. Medkh. Tekh. Fiz., no. 5:135-137, Sept.-Oct. 1965. 2 refs.

The effect of suspended particles on the degeneration of isotropic turbulence in a liquid is analyzed, and expressions are derived for the path of the correlation tensor, damping of turbulent pulsations, and a longitudinal correction coefficient.

10812 APTIC NO. 28534

Otto, K., M. Shelef, and J. T. Kummer

STUDIES OF SURFACE REACTIONS OF NO BY ISOTOPE LABELING. II. DEUTERIUM KINETIC ISOTOPE EFFECT IN THE AMMONIA-NITRIC OXIDE REACTION ON A SUPPORTED PLATINUM CATALYST.

J. Phys. Chem., 75(7): 875-879, Apirl 1971. 18 refs.

The existence of a kinetic isotope effect was established when substituting trideuterioammonia for ammonia in the reaction between ammonia and nitric oxide over a supported platinum catalyst at 202.5 deg. The ratio of the overall reaction rates at this temperature is NH3/ND3 approximately equal to 1.4. The reaction of NH3 (or ND3) with NO is of zero order, indicating that the rate-determining step occurs in the adsorbed layer, and this step is interpreted as the surface dissociation of ammonia. (Author abstract)

10813 APTIC NO. 28553

Papp, Louis S.

FILTER APPARATUS.

(North American Rockwell Corp., Pittsburgh, Pa.) U. S. Pat. 3,552,101. 8p., Jan. 5, 1971. 10 refs. (Appl. Jan. 23, 1969, 17 claims).

A take up roll support structure was invented for roll type filters. The air filter apparatus uses at least one web of permeable material as a disposable filter medium. Each web of the filter medium is advanced from a supply roll in the supply zone through an air filter zone into a discharge zone which has a take up roll. The take up roll support includes a pair of spaced bearings, a drive shaft extending through the take up roll, and a means to form a drive connection between the take up roll and drive shaft. The apparatus has a minimum number of distinct parts, to accommodate a wide variety of installation requirements and to permit rapid removal and replacement of a filled take up roll.

10814 APTIC NO. 28555

Brey, Wallace S., Jr., R. B. Gammage, and Y. P. Virmani

ELECTRON PARAMAGNETIC RESONANCE STUDIES OF CARBON MONOXIDE ADSORBED ON THORIUM OXIDE.

J. Phys. Chem., 75(7):895-901, April 1, 1971. 18 refs.

Adsorption of carbon monoxide on well-outgassed thorium dioxide at room temperature leads to the production of several radical species. A conventional spectrometer was used to obtain the electron paramagnetic resonance data. Species A, formed first, may be related to the presence of impurities on the surface and has a lifetime of only a few minutes. In a rate process which continues over several days, two interconvertible radicals are produced. B which has an asymmetric g tensor; and C which has an axially symmetric tensor. At higher pressures, the equilibrium between the two radicals is temperature dependent, but pumping out excess CO causes conversion into radical C, as does the presence of water vapor. Following evacuation, the intensity of the signal of C grows slowly over a period of several hundred hours, and thus this species must arise from very tightly bound carbon monoxide. Increasing the temperature causes a sequence of reactions to occur on the surface, in contrast to the behavior of CO on magnesium oxide. Species D, stable around 100, has some resemblance to species A and may represent nearly neutral or somewhat positive CO. It gives way, at about 200, to species E, the spectrum of which indicates that it is carbon dioxide (-). Following heat treatment of the sample at any temperature from 150 to 350, a signal of low g value is observed, and its appearance seems to be at the expense of the adsorbed radicals. Finally, at about 500, the adsorbate signal gives way to one which is characteristic of carbon. (Author abstract)

10815 APTIC NO. 28568

Soo, S. L. and C. L. Tien

EFFECT OF THE WALL ON TWO-PHASE TURBULENT MOTION.

J. Appl. Mech., vol. 82:5-11, March 1960. 12 refs. (Presented at the American Society of Mechanical Engineers, Applied Mechanics Division, West Coast Conference, Stanford, Calif., Sept. 9-11, 1959.)

An understanding of wall interference on two-phase turbulent motion is required because a wall is present in almost all physical applications. This is particularly significant when treating transport processes other than momentum transfer. In the heat transfer process from a wall-to-wall stream, for example, the particle motion near the wall affects predominantly this rate process. This type of two-phase flow is also involved in propulsio devices where the transfer surface is allowed to erode so that a higher temperature can be used to achieve the best possible performance. In the present investigation, motion of a single spherical solid particle near the wall of a turbulent fluid is considered. The analysis consists of the basic equation of motion of wall interferences on a two-phase turbulent field, and the solution of the equation including only significant contributions for the stationary case. The solution shows that the intensity of wotion of solid particles is affected by the presence of the wall and the distribution of turbulent intensity of the stream near the wall. The intensity of motion of solid particles can be significantly higher than the turbulence intensity of the mean stream. These modifications are consequences of the Bernoulli force acting between the wall and the particle. (Author abstract modified)

10816 APTIC NO. 28606

Ishikawa, Yoshinori and Konosuke Nishida

ANALYSIS OF DRIVING PATTERN.

(Jidosha soko yoshiki no kaiseki). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):247, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th 1970.)

In determining the driving pattern in a selected area in a selected time range, it is necessary to choose the driving rate at random. For that purpose, data for determining the proportion of left and right turns and straight driving are necessary. After the route has been determined, appropriate drivers and speed-recording devices are required. In addition, care must be taken so that the personal driving characteristics of the drivers are removed. The device that was used in the present analysis was a tacograph with 24 min/cycle. In obtaining the number of modes involved in one driving cycle, transition probabilities for stopping, accelerating, constant speed, and decelerating are necessary. An example for the case of the present analysis is tabulated. Based on these transition probabilities, simple Markov chain theory can be used to obtain the average recurrence time which represents the number of modes. Also, from the driving data, speed at certain time-intervals are read off to obtain the transition probability for each speed range. An example is given for five-sec intervals. From this probability, average recurrence time at O km/hr condition can be obtained; this represents the time of one driving cycle.

10817 APTIC NO. 28643

Armor, J. N. and H. Taube

EVIDENCE OF A BINUCLEAR NITROUS OXIDE COMPLEX OF RUTHENIUM.

Chem. Commun., vol. 7:287-288, April 1971. 6 refs.

A binuclear nitrous oxide complex, (Ru(NH3)5)2N2O(BF4)4, was isolated from the reaction between equopenta-ammineruthenium(II) and N2O at 1 atm. Conditions of preparation of the complex are reviewed, and infrared absorption and thermal stability data are presented for the complex. The preparation showed low analyses for N and appeared to contain 2Ru for each N2O. (Author abstract modified)

10818 APTIC NO. 28678

Suzuki, H.

ON THE DEHYDRATION REACTION OF PYROLOTITE BY SULFUR DIOXIDE.

Nippon Kogyo Butsurikagaku Kenkyu (Tokyo) (Japan. Ind. Phys. Chem. Res.), no. 22:293-297, 1969 (?). Translated from Japanese, Belov and Associates, Denver, Colo., 8p., April 30, 1970.

A method of obtaining sulfur and iron by the desulfurization reaction of pyrolotite FeS was studied. The sulfur was estimated by the iodine method and iron by the standard potassium permanganate method. The sample consisted of 83.2% FeS. An electric furnace was used to heat a quartz reaction tube to a preassigned temperature and air was exhausted from the system by nitrogen. The sample was broken into small pieces and inserted in the quartz reaction tube. The nitrogen was switched to sulfur dioxide at a constant speed. After a given amount of reaction time the SO2 is again switched to nitrogen, the temperature of the electric furnace was lowered, the sample removed, and the reaction rate was calculated by estimating the leftover sulfur. Equations are given for the calculation of the thermodynamic analysis of the reaction. To find the best conditions for the reaction, a constant-size sample, 0.5 g, was used and the reaction time set for 1 hour. By changing the temperature and the flow velocity of SO2, the reaction time could be studied. When a temperature higher than 900 C is used with the appropriate flow velocity of SO2 (40-60 cc) the reaction takes place almost perfectly in 90 to 120 minutes.

10819 APTIC NO. 28701

Mumma, M. J., E. J. Stone, and E. C. Zipf

EXCITATION OF THE CO FOURTH POSITIVE BAND SYSTEM BY ELECTRON IMPACT ON CARBON MONOXIDE AND CARBON DIOXIDE.

J. Chem. Phys., 54(6):2627-2634, March 15, 1971. 23 refs.

Absolute excitation cross sections were measured for five vibrational bands of the carbon monoxide fourth positive band system. The bands were produced by electron impact on CO and carbon dioxide, and the cross sections were measured from threshold to 350 eV. Relative intensity measurements on 28 bands were used to determine the dependence of the electronic transition moment on the r centroid. This has enabled the array of absolute transition probabilities to be calculated, as well as the total absorption oscillator strength. Relative populations of the first five vibrational levels were also determined for dissociative excitation of CO2 and they differed from the relative populations which resulted from direct excitation of CO. Since the absolute cross sections have been measured as a function of electron energy, they may be folded into the photoelectron energy spectrum for the Mars upper atmosphere and should provide a way of deciding how the CO fourth positive bands are produced as an emission feature in the Mars upper atmosphere. (Author abstract modified)

10820 APTIC NO. 28702

Parrish, David D. and Ronald R. Herm

MOLECULAR BEAM KINETICS. II. MAGNETIC DEFLECTION ANALYSIS OF REACTIONS OF LI WITH NO2, CH3NO2, SF6, CCL4, AND CH3I.

J. Chem. Phys., 54(6):2518-2528, March 15, 1971. 36 refs.

Thermal energy crossed molecular beam studies have been made of the reactions of lithium with nitrogen dioxide, nitromethane, sulfur hexafluoride, carbon tetrachloride, and methyl iodide. An inhomogeneous deflection magnet between the collision zone and detector was used to distinguish elastic scattering of Li from reactive scattering of LiZ. The total reaction cross sections and the reactive attenuations of the wide-angle Li nonreactive scattering for these gases are considerably smaller than are the corresponding features previously reported for the Li plus XY (halogen) reactions. Interesting differences are observed in the LiZ center-of-mass product angular distributions fo the five gases studied here. The LiO product of the NO2 reaction is more sharply forward peaked in the direction of the incoming Li atom than are the corresponding LiX products of the Li plus XY reactions. The LiNO2 and LiF products of the CH3NO2 and SF6 reactions exhibit very broad, almost isotropic center-of-mass angular distributions. The LiCl and LiI products of the CCl4 and CH3I reactions are predominantly scattered into the backward hemisphere in the c.m. corrdinate system. The features of the NO2 reaction are discussed in terms of the electron transfer mechanism which was originally advanced to account for the features of the reactions of the alkali atoms with the halogen molecules. (Author abstract)

10821 APTIC NO. 28703

Puckett, L. J. and M. W. Teague

PRODUCTION OF H2O(+) NH2O FROM NO(+) PRECRUSOR IN NO-H2O GAS MIXTURES.

J. Chem. Phys., 54(6):2564-2572, March 15, 1971. 12 refs.

Photoionization stationary afterglow techniques were employed to determine reaction rate constants for ions reacting in nitric oxide-water gas mixtures. Krypton resonance radiation at 123.6 and 116.5 nm was used to ionize only the NO molecules. The NO(+) ion was the precursor to a chain of reactions resulting in formation of NO(+) nNO(n equals 1, 2), NO(+) nH2O (N equals 1, 2, 3), and H3O(+) nH2O(n equals 2, 3, 4). Rate constants and/or equilibrium constants are provided for all forward and all reverse reactions at 296 K. (Author abstract modified)

10822 APTIC NO. 28712

Flockhart, B. D., K. J. Ivin, R. C. Pink, and B. D. Sharma

THE NATURE OF THE RADICAL INTERMEDIATES IN THE REACTION BETWEEN HYDROPEROXIDES AND SULPHUR DIOXIDE AND THEIR REACTION WITH ALKENE DERIVATIVES: ELECTRON SPIN RESONANCE STUDY.

Chem. Commun. vol. 7:339-340, April 1971. 13 refs.

The radicals HOSO2, MeSO2, and ButOSO2 were observed by electron spin resonance as intermediates in the reactions between hydroperoxides and sulfur dioxide; these radicals or their precursors add to alkene derivatives to give adducts that can also be characterized by electron spin resonance. Reaction mechanisms leading to formation of the radicals are discussed. (Author abstract modified)

10823 APTIC NO. 28727

Hiester, Nevin K.

CONVERSION OF ILMENITE UTILIZING SULFUR DIOXIDE.

(Bechtel Corp., San Francisco, Calif.) U. S. Pat. 3,560, 153. 2p., Feb. 2, 1971. 6 refs. (Appl. Feb. 27, 1969, 2 claims).

One of the most inexpensive and most common ores containing titanium is ilmenite, many processes have been proposed for the conversion of ilmenite to rutile, a much more expensive mineral which lends itself to industrial use, either as such or as a source for titanium metal. Most of the processes proposed include a sulfidizing step wherein the iron content of ilmenite is converted to the sulfide while the titanium is left in the oxide form. After such a conversion, the iron sulfide can be leached out leavin substantially pure rutile. Most reagents which have been proposed in the past have been relatively expensive, toxic, and corrosive. In the present method, sulfur dioxide is used in the presence of a reductant for the rapid and inexpensive conversion of the ilmenite to the form in which the iron is is converted into the sulfide. Further, it has been found that sulfurous acid, i.e. a solution of sulfur dioxide in water, is a suitable reagent for leaching the iron sulfide, leaving the titanium dioxide behind. During the conversion step, elemental sulfur is deposited, but this can be readily converted by a simple roasting step to sulfur dioxide which can be returned to the process. Further, the leached iron solution can be readily oxidized to recover hematite which is itself a valuable material, and to release further sulfur dioxide which can be recycled back to either the sulfidizing or the leaching steps.

10824 APTIC NO. 28757

Campbell, I. M., S. B. Neal, M. F. Golde, and B. A. Thrush

NEW OBSERVATIONS OF NITRIC OXIDE BETA BAND CHEMILUMINESCENCE.

Chem. Phys. Letters (Amsterdam), 8(6):612-614, March 15, 1971. 5 refs.

The intensity of nitric oxide beta emission produced by the chemiluminescent combination of nitrogen and oxygen atoms is not strictly proportional to (N)(O). The accepted mechanism for NO beta emission in the combination of ground state nitrogen atoms and oxygen atoms assumes that the Frank-Condon principle is important in the collision induced transitions. Action of N, O, and O_2 on a precursor of the emitting beta (2) Pi state produces both quenching and enhancement effects which have little temperature dependence. (Author abstract modified)

10825 APTIC NO. 28758

Slebodzinski, T., T. Urbanski, and W. Biernacki

REACTION OF 2-NITROPROPANE WITH NITROGEN DIOXIDE IN GAS PHASE.

Bull. Acad. Polon. Sci., Ser. Sci. Chim., 18(11-12):677-680, 1970. 8 refs.

The reaction of 2-nitropropane with nitrogen dioxide was examined to determine whether 2,2-dinitropropane could be formed. Nitration was carried out with a 1:2 molar ratio of 2-nitropropane:nitrogen dioxide, at 300 and 360 C. The liquid products leaving the reaction tube were composed of unreacted 2-nitropropane (54-68% of the amount used in the reaction), nitromethane and nitroethane (4-7% and 1.4-2.5%), 3-nitropropane-1-ene (3%), and formaldehyde and oxalic acid (0.1-0.2% and 1%). The formation of 3-nitroprop-1-ene, nitromethan and formaldehyde, could be explained by admitting the formation of 1,2-dinitropropane (I) which, upon the loss of HNO_2, could yield three nitroolefins: 1-nitroprop-1-ene (II), 2-nitroprop-1-ene (III) and 3-nitroprop-1-ene (IV). It is likely that (II) could also be formed from (IV) through its isomerization at a high temperature. Compound (II) could yield nitromethane and (undetected) acetaldehyde, and (III) could be responsible for the formation of nitroethane and formaldehyde. It is also suggested that acetaldehyde was eventually transformed into oxalic acid.

10826 APTIC NO. 28759

Otto, K., M. Shelef, and J. T. Kummer

STUDIES OF SURFACE REACTIONS OF NO BY ISOTOPE LABELING. III. THE EXCHANGE OF OXYGEN BETWEEN NO AND THE SURFACE OF IRON OXIDE.

Z. Physik. Chem. Neue Folge (Frankfurt), 72(4-6):316- 329, 1970. 18 refs.

The exchange of oxygen between nitric oxide and the surface of supported and non-supported iron oxide was studied in the 25-220 C temperature range. Exchange of oxygen between oxygen-containing gaseous molecules and oxide surfaces has been an important tool in studying the catalytic properties of these surfaces. The specific rate and extent of the exchange were both considerably larger on the unsupported sample. At 220 C the oxygen exchange on the pure alpha-Fe_2O_3 exceeded the amount that could be associated with the surface oxygen. Using NO molecules alternately labeled by N-15 and 0-18, it was established that the exchange between the gas phase and the adsorbed layer is faster than that between the gas phase and the oxide oxygen. The observed low temperature exchange provides an indirect support for the 'oxygen transfer' mechanism of the oxidation of carbon monoxide by NO on the supported iron catalysts. At 220 C a source of surface oxygen associated with the gamma-Al_2O_3 support is contributing to the exchange. (Author abstract)

EFFECTS-HUMAN HEALTH

10827 APTIC NO. 27894

Stokinger, Herbert E.

THE SPECTRE OF TODAY'S ENVIRONMENTAL POLLUTION--USA BRAND: NEW PERSPECTIVES FROM AN OLD SCOUT.

Am. Ind. Hyg. Assoc. J., 30(3):195-217, May-June 1969. 128 refs.

A comprehensive toxicologic evaluation was made of the potential hazards to human health from man-made and natural environmental pollutants as they occur in the continental United States now and in the foreseeable future. These substances include: arsenic, asbestos, beryllium, cadmium, various organophosphorus insecticide combinations, pesticides, food additives, carbon monoxide, nitrogen oxides, sulfur oxides, lead, nitrates and nitrites, nickel, asthmatic agents, oil mists, selenium, and hard water. Carcinogens cocarcinogens, accelerators, promotors, and cancer inhibitors are also discussed, including hereditary susceptibility and resistance, teratogens and mutagens. Chromium and fluoride are described as both beneficial and toxic. The role of ozone and free radical oxidants in aging and longevity is cited. Twelve disease states for which the evidence points to environmental pollutants as either direct or contributing causes are presented tabularly. Acceleration of aging is the dominant characteristic of the effect of many of the top eight of the environmental pollutants. Airborne pollutants possess greater potential for contributing to man's deteriorating health with age than do water and food-borne contaminants together. As a rule, pollutants express their effects only through interaction either with other agents or with some preconditioning factors within the host, be they infectious agents, trace-element deficiencies or genetic defects of metabolism. The homeostatic mechanisms leading to adaptation provide the balance to counteract the effects of pollutants at existing levels in the U.S.A. among the majority of the population. To measure only the pollutants without the counteractants can lead to an overestimation of the health problem. (Author summary modified)

10828 APTIC NO. 27895

Boysen, John E.

HEALTH HAZARDS OF SELECTED ROCKET PROPELLANTS.

Arch. Environ. Health, vol. 7:71-75, July 1963. 2 refs.

Many of the present day propellants and oxidizers present unusual problems because of their high order of toxicity and the huge quantities used. The current 'concept of concurrency' also creates additional problems because design and procedural decisions must be made before the development of adequate toxicological and clinical data. Design of toxicological experiments is discussed, including the basis for threshold limit values. During the course of experimentation and clinical observation, efforts are made to determine the mechanisms of toxic stress as well as to find the early indicators of response to toxic agents. Indicators of physiological or pathological change are mentioned. Evaluation of the operational risk which is involved in the transport, storage, and firing of rocket propellants is a problem of considerable magnitude. The design of a medical program involving the use of propellants must also include periodic examinations and the treatment of casualties. Symptoms are mentioned due to exposure to unsymmetrical dimethylhydrazine, pentoborane, nitrogen tetroxide, chlorine trifluoride, perchloryl fluoride, and n-propyl nitrate.

10829 APTIC NO. 27904

Fannick, Nicholas L. and Morton Corn

THE PLASMA JET: INDUSTRIAL HYGIENE ASPECTS AND A SURVEY OF CURRENT UNITED STATES PRACTICES FOR EMPLOYEE PROTECTION.

Am. Ind. Hyg. Assoc. J., vol. 30:226-235, May-June 1969. 24 refs.

The theory of the plasma torch and a history of its industrial application are presented. Hazards associated with industrial usage are cited, with emphasis placed on contaminant concentration data collected from industrial hygiene surveys. As do other electric arc devices, the plasma jet produces intense quantities of visible light, and personnel in the area should wear full face shields containing filters for eye protection. A large amount of ultraviolet radiation is produced, and all parts of the body which could be exposed should be covered to protect against skin burns and the possible harmful reaction to ultraviolet radiation of workmen being treated with certain drugs. Dark clothing is preferred, to reduce the possibility of reflection underneath the welder's mask. Exposure to infrared radiation can cause cataracts after several years of exposure, and, in some cases, radiant heat is substantial and aluminized gloves and bibs may be necessary. Although equipment is well insulated. frequent and thorough inspection for shock hazards is necessary. Ozone is formed by ultraviolet radiation acting on oxygen in the air, and it exerts a powerful irritating action on the mucous membranes of the respiratory organs and is also irritating to the eyes. The threshold limit for ozone in air is 0.1 ppm. Oxides of nitrogen are formed by the combination of oxygen and nitrogen atoms after molecular dissociation caused by the plasma flame. The threshold limit value for oxides of nitrogen (as NO2) is 5 ppm or 9 mg/cu m. Exposure to high concentrations may cause death, while chronic exposure to lower concentrations may result in lung damage. The sound intensity level produced in plasma torch operations is dependent on the rate of gas flow in the torch nozzle, which in turn is dependent on the heat exchange properties of the gas and the requirements of the job. At present, it is suggested that a sound intensity reading above 100 dB indicates that the noise is probably unsafe for everyday exposures. A list of concentrations of various fumes generated at plasma torch operations is included. Plasma arcs cannot be used in areas where chlorinated hydrocarbons are in use because ultraviolet radiation from the arc decomposes the solvent vapors to form irritating and/ or toxic gases, including phosgene. Carbon monoxide can be formed from the recombination of dissociated carbon dioxide. Several different methods of providing exhaust ventilation are mentioned.

10830 APTIC NO. 27908

Oettingen, W. F. von

THE TOXICITY AND POTENTIAL DANGERS OF NITROUS FUMES.

Public Health Bulletin, no. 272, 30p., 1941. 122 refs.

The toxicologic properties of the different constituents of nitrous fumes (nitric oxide, nitrogen dioxide, nitrogen tetroxide, and nitrous and nitric acids) are described as a basis for appraising the potential dangers of the fumes. Variations in the conditions which produce these fumes, as well as variations of the individual susceptibility and differences in the concentration of nitrous fumes influence the clinical picture of this type of poisoning. Review of the literature shows that nitrogen dioxide (NO2) is the most important oxide of nitrogen from the toxicologic point of view. Methods of determining NO2 in air are described. Sources of exposure to nitric oxides, existing in a number of industries, are discussed. Human fatalities from NO2 poisoning are reported. Clinical aspects and late effects of nitrous fume poisoning are described. The mechanism of the toxic action of nitrous fumes is explained and suggestions are given for the prevention of nitrous fume poisoning. Various methods of treating nitrous fume poisoning are described and evaluated.

10831 APTIC NO. 27910

Kawasaki Otolaryngologists Assoc. (Japan)

THE EFFECTS OF AIR POLLUTION ON THE OTOLARYNGEAL AREAS OF SCHOOL CHILDREN.

(Kogai-taiki osen - ga gakudo no jibika ryoiki ni oyobosu eikyo). Text in Japanese. Nihon Iji Shinpo (Japan. Med. J.), no. 2416:12-18, Aug. 15, 1970. 12 refs.

Kawasaki was divided into three areas according to the level of pollution; by physical examinations and questionnaire surveys, effects of air pollution on the otolaryngeal areas of school children were investigated. The number of complaints concerning eyes, ears, and nose was the largest in the eastern district of Kawasaki, followed by central and western districts. Upon physical examination, the number of afflictions was the largest in the eastern district, also followed by central and western districts. The results of physical examinations and the outcome of the questionnaire survey were correlated. In terms of questionnaire results concerning nose bleeding, there were no real differences; in general, bleeding cases were frequent, and showed significant differences compared to nonpolluted areas in Kanagawa Prefecture. Combining the above results, it was inferred that air pollution in Kawasaki is having a considerable influence on the upper respirator organs of school children. It is hoped that further experimental and epidemiological studies will be conducted on the otolaryngological effects of air pollution.

10832 APTIC NO. 27913

Yokohama Municipal Office (Japan), Public Nuisance Control Center

ON THE EFFECTS OF LOW-CONCENTRATION NITROGEN DIOXIDE ON THE LIVING BODY.

(Teinodo nisankachisso no seitai eno eikyo ni tsuite). Text in Japanese. 24p., March 1970.

In order to find a medically effective index to evaluate the toxicity of the automobile exhaust gas, small laboratory animals such as rats, mice, and guinea pigs were exposed continuously to very low concentrations of nitrogen dioxide. The effect of the gas on the animals' growth and physical strength, blood quality, and irritation to the lung tissues was investigated. Nitrogen dioxide was produced by reacting metallic copper and nitric acid, then diluting it with a large quantity of fresh air, and scrubbing it in potassium permanganate solution. The concentration was measured by Kitagawa detector and Saltzman methods. Although there was no significant difference in the effects on growth between experimental and control groups, testing by swimming method showed that body weight decreased with the length of exposure period. In general, improvement in blood quality was seen, but it is not certain whether the improvement is the initial phenomenon associated with poisoning. Lung histamine as well as free histamine content increased with exposure. The water content of the lungs of mice did not change with exposure to NO2, but there was a significant increase in the weight of guinea pig lungs.

10833 APTIC NO. 27920

Mie Prefecture (Japan), Public Nuisance Control Bureau

THE SPECIAL INVESTIGATION REPORT ON AIR POLLUTION IN YOKKAICHI AREA. THE REPORT OF THE SUBCOMMITTEE FOR EPIDEMIOLOGICAL INVESTIGATION. PUBLIC NUISANCE MATERIAL NO. 14.

(Yokkaichi chiku taiki osen tokubetsu chosa ekigaku chosa shoiinkai hokokusho). Text in Japanese. 44p., March 1964.

The effects of air pollution in Yokkaichi were investigated and the results were tabulated in diagrammatical and tabular form. Perception of school children concerning air pollution showed that complaints against bad odor were overwhelmingly numerous. Questionnairs presented to the residents in polluted and control areas showed distinct differences in conscious sympotoms. In order to see the effects of air pollution on healthy persons, pulmonary function tests were conducted by means of Wright-peak- flow meter on school children, and peak-flow values were compared for different areas. In the polluted area, the peak-flow values were distinctly lower for boys. In a similar test conducted on the elderly, for both men and women, the values were lower in the polluted area. Other items included the morbidity of the residents, as well as the mortality, and the effects of air pollution on specially designated pollution victim patients. Of the 31 persons whose asthmatic symptoms had become worse, most of the symptoms had started to appear around five years previously, right after the petrochemical complex had moved into the area.

10834 APTIC NO. 27926

Shalamberidze, O. P.

REFLEX EFFECTS OF MIXTURES OF SULFUR AND NITROGEN OXIDES.

(Reflektornoe deistvie smesi sernistogo gaza i dvuokisi). Hyg. Sanit., vol. 32:10-15, July-Sept. 1967. 7 refs.

The olfactory threshold for sulfur dioxide for the majority of 15 human subjects was found to be 1.6 micrograms/cu m. The olfactory threshold for nitrogen dioxide for the majority of 14 subjects was 0.23 microgram/cu m. The total concentration of a perceptible mixture of SO2 and NO2, expressed as fractions of the threshold concentrations, was 1.02 (0.55 for SO2 and 0.47 for NO2), indicating a complete summation of the effect of the substances. Adaptometric tests showed that the threshold of the reflex effect on the cerebral cortical function is 0.6 microgram/cu m for SO2 and 0.14 microgram/cu m for NO2 in the most sensitive persons. The ineffective concentration was 0.087 microgram/cu m NO2. Consequently, the existing maximum permissible one-time concentration of nitrogen oxides (0.3 microgram/cu m) should be lowered to 0.1 microgram/cu m. The nature of the reflexive effects of mixtures of SO2 and NO2 was also summative. The thresholds of the reflex effect of SO2 and NO2 on oral inhalation were higher than in the case of nasal inhalation. This points to a definite role for nasal cavity reciptors in the onset of reflex shifts occurring in man following aspiration of these chemical substances.

10835 APTIC NO. 27937

Cuthbert, James

CANCER OF THE LUNG - A PUBLIC HEALTH PROBLEM? Public Health (London), 74(4):123-130, Jan. 1960. 10 refs.

The increasing incidence of lung cancer is noted and the methods and difficulties of its diagnosis are outlined. The criteria by which a diagnosis was made in a series of 96 cases are listed. Treatment is discussed and it is noted that only one third of all cases are suitable for radical surgery in spite of a more general awareness of the disease and improved diagnostic facilities. The immediate prognosis is poor, even with early diagnosis, until a specific cure is found. The approach to the problem should be by an increased preventive drive. Local authorities should be given much more government backing to tackle known hazards such as cigarette smoking, atmospheric pollution, and certain trades where there is a risk, although the dangers from the atmosphere are less clearly defined than those from smoking. Such action would incidentally help to solve the problem of chronic bronchitis. Research into cancer's causation and treatment should be increased. (Author abstract modified)

10836 APTIC NO. 27940

Nielsen, S. W. and A. Horava

PRIMARY PULMONARY TUMORS OF THE DOG. A REPORT OF SIXTEEN CASES.

Am. J. Vet. Res., 21(84):813-830, Sept. 1960. 29 refs.

A search of the literature revealed descriptions of 103 canine primary pulmonary tumors, 63 of which were classified as adenocarcinomas. In this report, 16 more primary pulmonary carcinomas are added. They were diagnosed following 9,282 necropsies of dogs during the 31-year period from July 1, 1928, to July 1, 1959. On the basis of their histologic structure and the site of origin, they were classified as bronchiolar adenocarcinomas bronchial carcinomas, and bronchial adenoma. The bronchiolar adenocarcinomas of the dog appeared to have their primary focal origin in the periphery of the lung. Histologically, they had a single row of cuboidal cells in a papillary arrangement on thin connective tissue septa. The bronchial carcinomas originated in small secondary and tertiary bronchi, the mucosa of which was characterized by hyperplasia and squamous metaplasia. Two of the bronchial carcinomas had squamous transition, while the third was of the undifferentiated small-cell type. All three bronchial carcinomas had metastasized, but only two of the 12 bronchiolar adenocarcinomas showed lymphatic invasion and bronchial node metastasis. The bronchiolar adenocarcinoma constituted three fourths of all primary pulmonary neoplasms studied. The incidence of pulmonary neoplasms in necropsy material was approximately one in every 600 dogs. The average age encountered was 10 years. There was no sex predisposition or a definite breed predisposition evident in this material. The numerical increase of canine pulmonary tumors in recent years was not explained with certainty, but may be attributed to better diagnostic methods. (Author summary)

10837 APTIC NO. 27947

Gray, Edward LeB.

OXIDES OF NITROGEN: THEIR OCCURRENCE, TOXICITY, HAZARD.

A.M.A. Arch. Ind. Health, vol. 19:479-486, Jan.-June 1959. 51 refs.

The potentially hazardous oxides of nitrogen are nitric oxide and nitrogen dioxide (in equilibrium with N_2O_4), together with nitric anhydride ash a special case. Methods for determining the oxides in a given mixture are noted. NO_2 appears to be about four to five times as toxic as NO, but results of human and animal studies by various investigators on actual toxic concentrations and exposures, especially for NO_2 and N_2O_5, are extremely conflicting. The generally accepted maximum acceptable concentration for oxides of nitrogen in general has been 25 ppm or in some cases 10 ppm, although recently a figure of 5 ppm was adopted for NO_2. Four types of pathology produced by nitrogen oxides are distinguished: irritant type, reversible type, shock type, and a mixture of the first two. The irritant type develops after NO_2 inhalation. In attempting to explain some of the conflicting results of studies of toxicity of nitrous fumes, the complications caused by the very close interrelationship of NO and NO_2 are stressed. Information on the relative proportion of the two compounds in a given hazardous fume mixture is rarely available. It appears that the toxicity of the gaseous mixture is roughly proportional to the amount of NO_2 present and that sources of gas which produce mostly NO_2 show greater toxicity than sources which produce large quantities of NO in the oxide mixture. Subjects and methods for future research are suggested as a means to clarifying the problem.

10838 APTIC NO. 27948

Eckardt, Robert E.

THE CHALLENGE OF OUR ENVIRONMENT. WHAT CAN WE LEARN OF IT FROM OCCUPATIONAL CANCER STUDIES? Arch. Environ. Health, vol. 9:127-132 July 1964. 10 refs.

Epidemiological studies of occupational cancer raise the question of whether there are genetic, biochemical, or other factors which result in only a small percentage of men with identical exposures developing cancer. Despite theoretical objections, there appears to be some 'practical' threshold for carcinogenesis with which humans can live with no detectable increase in cancer risk. Established causes of occupational lung cancer are all in mineral industries (e.g., chromates, nickel refining, asbestos), yet in studies of relationships between lung cancer and smoking and/or air pollution, minerals have been essentially ignored in favor of concentrated efforts on the polyaromatic hydrocarbon carcinogens. Study of co-carcinogens, promotors, or accelerators has also been neglected; for example, in skin cancer, accelerating activity may sometimes be far more important than the concentration of the carcinogens themselves. Water-soluble carcinogens like beta- naphthylamine should be more intensively studied. The general unreliability of cancer incidence statistics, and the use of incorrect data as a basis for establishing further correlations, e.g., as in a study of lung cancer and air pollution, impede epidemiological investigations. A hypothesis is reported suggestin that the incidence of some cancers decreases in response to unknown factors even when no breakthroughs or improvements are made; thus a decline in lung cancer that occurs after air pollution is reduced does not necessarily prove that air pollution causes lung cancer.

10839 APTIC NO. 27961

Osaka Prefecture (Japan) Dept. of Environmental Hygiene

REPORT OF CONFERENCE OF SPECIAL COMMITTEE ON HEALTH SURVEY CONDUCTED OF POLLUTION IN OSAKA PREFECTURE.

(Osakafu kogai kenko chosa senmon iinkaigai). Text in Japanese. 45p., Jan. 27, 1971.

Results are reported for surveys of the health effects of emissions from an artificial leather company, a chemical company, a cotton cloth bleaching company, and a zinc plating plant. In addition, data are presented for a survey of the effects of lead in auto exhaust on housewives and for a survey of the effects of cadmium contaminated crops. Based on interviews and blood and urine tests, the survey of housewifes indicated no adverse effects attributable to lead. Of 111 persons in Yao City who were examined for the effects of cadmium, 11 showed positive urine protein. These surveys were conducted in Osaka Prefecture.

10840 APTIC NO. 27965

Weller, W.

REPORT ABOUT THE 'THIRD INTERNATIONAL SYMPOSIUM ON INHALED PARTICLES'.

(Bericht ueber das 'Third International Symposium on Inhaled Particles). Text in German. Staub-Reinhalt. Luft, 31(1):25-27, Jan. 1971.

At the symposium organized by the British Occupational Hygiene Society in London in September 1970, 150 scientific papers were read dealing with the causes and mechanisms of pulmonary processes and of processes taking place in the respiratory tract induced by dust inhalation, with the significance, function and degree of purification of dust deposits by the respiratory system and with biological reactions induced by the action of dust. Some industria dusts accumulate in the lungs and are there biologically active. It is still unclear whether in the mechanism of cellular damage induced by silica dust, lysosomal damage is a primary result or whether the destruction of the lysosomes is a secondary consequence. Equally undecided is the question of the relationship between the cytotoxic effect of dust and the fibrogenic effect. The cytotoxicity of silica dust seems to vary with the electronic structure of dusts. The prophylaxis and therapy of silicosis, the effect of electronic structure of asbestos dust on its cytotoxicity, the maximal permissible dust concentrations in the mining of minerals and results of long-term dust inhalation experiments with laboratory animals and recently discovered aspects of the etiology and pathogenesis of lung diseases induced by dusts were discussed.

10841 APTIC NO. 27969

Tomsikova, Alena and Dana Novackova

THE STUDY OF ENVIRONMENTAL FUNGI. I. MYCOFLORA IN THE ATMOSPHERE OF PILSEN (CSSR) (PART B).

(Zum Studium der opportunistischen Pilze. I. Pilzflora in der Atmosphaere von Pilsen (CSSR) (Teil B). Text in German. Mykosen, 14(2):93-101, 1971. 194 refs.

Of mycoflora identified in the atmosphere, in rooms, in dust and on objects, fungi imperfecti were the most numerous. The fungal spectrum and the total number of colonies in atmospheric air was essentially stable over a three year observation period and the same was true of two sampling sites. In atmospheric air Cladosporium herbarum predominated, on objects and in room dust Pullularia decumbens. Apartments of persons suffering from bronchial asthma and from asthmoid bronchitis were more strongly contaminated with fungi than apartments of persons suffering from bronchitis. In the former, Pullularia decumbens, Mucor globusus, Cladosporium herbarum and Pullularia viridicatum predominated; the latter, Pullarlaria decumbens, Mucor globusus and Alternaria tenuis. In other rooms the mycoflora was more uniform. The highest colony count was found in apartments, in schools and in hospitals. Monthly, daily and hourly variations were recorded for most fungus species with the maximum number of spores counted between 14.00 and 18.00 hours. Cladosporium herbarum manifested a peak at 16.00 hours. Pullularia decumbens at 18.00 hours. Climatological factors governed the occurrence of the various species and the number of colonies.

10842 APTIC NO. 28010

Hernberg, S. and J. Nikkanen

ENZYME INHIBITION BY LEAD UNDER NORMAL URBAN CONDITIONS.

Lancet, 1(7637):63-64, Jan. 10, 1970. 15 refs.

A close negative correlation was found between the concentration of lead in blood and the activity of erythrocyte delta aminolevulinic acid dehydrogenase in 26 healthy individuals, never exposed occupationally to lead. The concentration of lead in whole blood was measured after wet ashing using a dithizone method, while ALA dehydrogenase was measured from fresh heparinized whole blood according to Bonsignore's method. As a result of growing industrial use and the introduction of alkyl lead compounds as gasoline additives, exposure to lead is substantially above the background of absorption from food and drinking water. Present levels of environmental contamination with lead can produce a measurable biochemical alteration in man. (Author summary modified)

10843 APTIC NO. 28011

Armstrong, David W.

THE MEASUREMENT OF URINARY LEAD CONCENTRATION BY A SPECTROGRAPHIC METHOD.

Public Health Bulletin, no. 262:83-86, 1941.

The results of a quantitative spectrographic analysis of urinary lead are presented in the form of a graph of the distribution of urinary lead values in relation to atmospheric lead exposure and of a table of the urinary lead content of four exposure groups. The relations between urinary lead concentrations and lead exposure are further illustrated in a figure showing the extent of variations of concentration values above and below the mean for each of the four groups. The values obtained by spectrographic methods are in good agreement with the results of chemical analysis by the dithizone method.

10844 APTIC NO. 28013

Armstrong, David W.

THE QUANTITATIVE ANALYSIS OF THE MERCURY CONTENT OF URINE BY A SPECTROGRAPHIC METHOD.

Public Health Bulletin, no. 263:106-110, 1941.

Reproducible values of mercury in urine were obtained by a spectrographic method in which sections of a special spectrographic graphite rod served as electrons. Both anodes and cathodes were drilled to a depth of five-eighths in. to receive the urine sample. This crater depth retarded excitation sufficiently to obtain a satisfactory photographic record. Thallium was used as an internal standard, and an exposure of 20 se at 22 amperes was found to be sufficient to volatilize the mercury and thallium completely. Under these conditions, the lowest value consistently attained by the analysis of prepared standards was 0.1 mg Hg/l (0.04 gamma of elemental mercury in the arc). The intensity of the radiation that produced the optical density of the exposed and processed photographic plate was determined from a prepared calibration curve. The spectrographic values are in good agreement with chemical values.

10845 APTIC NO. 28015

Selikoff, Irving J., E. Cuyler Hammond, and Jacob Churg

ASBESTOS EXPOSURE, SMOKING, AND NEOPLASIA.

J. Am. Med. Assoc., 204(2):104-110, April 8, 1958. 14 refs. (Presented at the American Medical Association, Annual Convention, 116th, Atlantic City, N. J., June 19, 1967.)

Asbestos insulation workers as a group, have a death rate from lung cancer about seven to eight times as a high as that reported for the general population. However, an investigation of 370 such workers, conducted from Jan. 1, 1963 to April 30, 1967, indicated that asbestos exposure alone is not the entire explanation. Of 87 noncigarette smokers, none died of bronchogenic carcinoma. Of 283 workmen with a history of regular cigarette smoking, 24 died of bronchogenic carcinoma, although only three were expected to die of the disease. Calculations suggest that asbestos workers who smoke have about 92 times the risk of dying of bronchogenic carcinoma as men who neither work with asbestos nor smoke cigarettes. It is concluded that occupational exposure to asbestos dust should be reduced to as low a level as possible, that asbestos workers who do not now smoke should never begin, and that those who do should stop immediately. (Author abstract modified)

10846 APTIC NO. 28019

Rosenzweig, Kurt A. and I. Abkewitz

PREVALENCE OF ENDEMIC FLUOROSIS IN ISRAEL AT MEDIUM FLUORIDE CONCENTRATION.

Public Health Rept. (U. S.), 78(1):77-80, Jan. 1963. 15 refs.

Examination of 262 children in Qiryat Haiyim, a suburb of Haifa, Israel, revealed the presence of endemic fluorosis. Local water contains about 0.75 ppm fluoride, the optimum level according to the formula of Galagan and Vermillion. Fluorosis was less prevalent and caries experience slightly but consistently higher in both sexes and at all ages in children who had been absent from Qiryat Haiyim for a continuous period of at least one month, but the mean decayed, missing, and filled teeth (DMF) of all age groups was within the limits observed in the major cities of the country. Climatic conditions which increase intake of water, as well as fluorides in seafood and tea, may be the cause of the endemic fluorosis. The slightly increased protection against caries does not justify the observed amount of fluorosis. (Author conclusions modified)

10847 **APTIC NO. 28020**

Hourihane, Dermot O'B

THE PATHOLOGY OF MESOTHELIOMATA AND AN ANALYSIS OF THEIR ASSOCIATIO WITH ASBESTOS EXPOSURE.

Thorax, vol. 19:268-278, 1964. 16 refs.

All the cases recorded from 1917 to 1962 as primary diffuse tumors of the pleura or peritoneum (mesotheliomata) in the necropsy files of the Bernhard Baron Institute of Pathology at the London Hospital are reviewed. Criteria essential in the diagnosis of these tumors are indicated. While many of the cases were known to have had asbestosis before death, the majority were not, and asbestos bodies were an unexpected finding on histological examination. It is of interest that the association with asbestos bodies was not restricted to any histological type, and the mixed or fibrous types were included in the association. No evidence as to how asbestos bodies affect the pleura and peritoneum was found.

10848 **APTIC NO. 28024**

Bruin, A. De

EFFECT OF LEAD EXPOSURE ON THE LEVEL OF DELTA-AMINOLEVULINIC- DEHYDRATASE ACTIVITY.

Med. Lavoro (Milan), 59(6-7):411-418, 1968. 13 refs.

The assay of aminolevulinic dehydratase activity in red blood cells was carried out in workers slightly exposed to inorganic lead, as well as in animals under the protracted influence of small amounts of the metal salt. In people working in a printing office, the enzyme activity was shown to be reduced on the average to 66% of a control group, despite the existence of urinary levels of coproporphyrine and delta-aminolevulinic acid not exceeding the upper normal limits. Rabbits subjected to repeated injections of lead acetate displayed a gradual decrease of ALA-dehydratase activity. Suppression of enzyme activity appeared to be dependent on the amounts of lead administered. In view of the early reduction of ALA-dehydratase activity, which largely precedes the increase of delta-aminolevulinic acid and coproporphyrine in the urine, estimation of the enzyme activity may be considered to provide a very sensitive test of increased lead absorption. It has been suggested that lead inhibits delta-aminolevulinic dehydratase activity by virtue of its affinity to the sulfhydryl-groups, indispensable for the enzyme activity. (Author summary modified)

10849 **APTIC NO. 28026**

Byrne, P. S.

THE PROBLEM OF CHRONIC BRONCHITIS IN GENERAL PRACTICE.

Practitioner, 203(1218):737-742, Dec. 1969. 15 refs.

In 1966, there were 30,000 deaths from chronic bronchitis in the United Kingdom, which is an annual mortality rate five to ten times that in comparable Western countries. The natural history of the disease, from the earliest recognition of the first stage to death from complications, may span a period of 20 or 30 years, and the stages may merge almost insidiously one into the other. The chief characteristic of the first stage is mucoid expectoration, while in the second stage the sputum is intermittently or continuously mucopurulent due to active infection. In the third stage there is a narrowing of the airways in addition to expectoration, and the complications of emphysema and/or heart failure occur. The incidence of chronic bronchitis rises with age. In middle age, males are twice as likely to be affected as are females, but in the 70-yr and over age group there is little difference. Social class has an important bearing, as does air pollution, fog, and smoking. Early diagnosis and pulmonary functio tests are mentioned, as well as general management during stages 1 and 2 of the disease. The team approach, physical measures, and treatment are considered. Drugs are indicated, as well as the management of respiratory and cardiac failure.

10850 **APTIC NO. 28028**

Baldwin, R. W., G. J. Cunningham, and D. Pratt

CARCINOGENIC ACTION OF MOTOR ENGINE OIL ADDITIVES.

Brit. J. Cancer (London), 18(3):503-507, Sept. 1964. 13 refs.

Examination of component fractions of a proprietary engine oil additive previously shown to be carcinogenic for mouse skin has demonstrated that the carcinogenic substances are contained almost exclusively in the base oil. Young adult male albino mice were employed in all tests. Oil samples were applied dropwise to the skin, once or twice weekly for periods of up to 12 months. Mice were examined for tumors at weekly intervals until the tests were terminated (18 months) and were killed when they were ill or when tumors were considered malignant. All tumors were taken for histological examination. The additive, which is used as a high pressure, high temperature lubricant, contains a formulation consisting mainly of lead naphthenate together with small amounts o chlorinated hydrocarbons such as carbon tetrachloride or 1:1:1:-trichlorethane dispersed in a mineral oil base. A further additive agent used mainly as an upper cylinder lubricant also proved to be carcinogenic for mouse skin. The significance of thes findings is discussed, particularly with regard to the possibility that these substances may be atmospheric pollutants. (Author summary modified)

10851 **APTIC NO. 28029**

Schepers, G. W. H.

THE MINERAL CONTENT OF THE LUNG IN CHRONIC BERYLLIOSIS.

Diseases Chest, 42(6):600-607, Dec. 1962, 17 refs.

Spectrographic analyses were made on 58 cases of alleged chronic berylliosis, and beryllium was demonstrable in 20 of the cases. Recent utilization of beryllium as a structural material in airplane skins and its increasing exploitation as a rocket fuel has stimulated greater production of the metal than could be foreseen, even a few years ago, when the unique role of beryllium in atomic energy programs suggested an extended industrial utilization of this substance. Differential diagnosis of the granulomatous lesions found in cases of berylliosis and sarcoidosis is a vexing problem. However, refinement of spectrographic methods for the identification of trace elements in biologic materials has enabled the simultaneous quantitative determination of a number of mineral constituents of the lung. The values for 22 other elements identified in the 20 cases in which beryllium was present are also cited. Certain trace elements, normally present in lung tissue, were not demonstratable. These included bismuth, cadmium, cobalt, gallium, and tin. Sodium and potassium concentrations were significantly decreased, which is of interest as these values are increased in sarcoidosis. The high concentration of beryllium in these cases of chronic berylliosis is in vivid contrast with the absence of beryllium in the lungs of the 30 cases of sarcoidosis.

10852 APTIC NO. 28030

Goldman, F. H.

THE QUANTITATIVE CHEMICAL ANALYSIS OF MERCURY IN AIR, URINE, TANK WATER, AND SETTLED DUST.

Public Health Bulletin, no. 263:111-118, 1941. 14 refs.

A series of experiments was conducted to determine whether mercury compounds passed into the air when carroted fur was treated with hot water in a manner which approximated certain operations regularly carried on in hat factories. It was found that mercuric nitrate could be recovered from the vapors released by moist carroted fur maintained at the temperature of boiler water. Becaus it appeared that there might be more mercury in the air in hatting factories than could be measured by the Nordlander instrument, a sampling method was devised for collecting both mercury vapor and mercury compounds for electrolytic analysis. The method includes treatment of a sample with chlorine and then with lead and hydrogen sulfide. A gold cathode and a platinum anode are used for electrolysis, while the current is obtained from a 6-volt storage battery hooked up in a series with a variable 60-ohm resistance. From this circuit, 1.3-1.5 volts are drawn off in the usual way. Addition of lead to the solution instead of copper considerably lessens the danger of contamination of mercury at the cathode.

10853 APTIC NO. 28032

Schroeder, Henry A., Joseph J. Balassa, Frances S. Gibson, and Shalini N. Valanju

ABNORMAL TRACE METALS IN MAN: LEAD.

J. Chronic Diseases, 14(4):408-425, Oct. 1961. 34 refs.

The concentrations of lead in a variety of foods, tissues, vegetation, and manufactured products were measured by a microanalytic chemical method, and data on human tissues obtained by spectrographic methods were analyzed statistically. All results are tabulated. According to the data, a reasonably liberal diet appears to have about the same amount of lead calculated in 1940 or approximately 0.29 mg/day or less. The amounts of lead in main tissues and organs are as follows: muscle, 4.8 mg; skin, 3.3 mg; skeleton, 46.2 mg; blood, 1.6 mg; gastrointestinal tract, 0.6 mg; liver, 3.4 mg; lungs, 0.7 mg; kidneys, 0.4 mg. In four tissues, the highest mean concentrations were four to ten times those at birth or in childhood. Variations in the amounts of lead found in different sections of a 96-yr old elm suggest increasing exposures during the last 100 years, and especially during the last 30. Presumably this increment represents airborne lead. The amount of lead ingested from food, water, or air appears much lower than the 0.8 mg suggested as a safe lead intake from all sources. Although lead is ubiquitous on the earth's crust and is present in plants, tissues, and organs, it probably is not an essential trace metal.

10854 APTIC NO. 28033

Adley, Frank E.

EXPOSURES TO OXIDES OF NITROGEN ACCOMPANYING SHRINKING OPERATIONS.

J. Ind. Hyg. Toxicol., 28(1):17-20, Jan. 1946. 1 ref.

The use of large oxyacetylene shrinking torches, particularly in small, unventilated compartments can produce dangerous concentrations of oxides of nitrogen. Under the conditions encountered it was found that excessive exposures can accumulate within a period of a few minutes. Contact of the flame with cold water or cool metal was found to have no noticeable bearing on the production of oxides of nitrogen. A close correlation was found to exist, however, between the production of this gas and the rate of consumption of acetylene gas by the torches. Excessive concentrations were present in the breathing zone of the operators working in confined spaces with all sizes of torch tips investigated; those of large capacity producing the highest concentrations. Contrasting tests obtained at shrinking operations in large, ventilated spaces showed that the resulting concentrations of oxides of nitrogen were noticeably less, although in some instances still excessive. Several tests for carbon monoxide failed to indicate the presence of any health hazard from this gas even in confined, unventilated spaces. (Author conclusions)

10855 APTIC NO. 28036

Stokinger, H. E.

TOXICOLOGIC PERSPECTIVE IN PLANNING AIR POLLUTION STUDIES.

Am. J. Public Health, 43(6):742-751, June 1953. 20 refs. (Presented at the American Association for the Advancement of Science, Annual Meeting, St. Louis, Mo., Dec. 29, 1952.)

Toxicology is discussed with respect to its potential for shaping the direction and course of studies of the effects of air pollution on urban health so that efforts will not be misdirected or wasted. Past and present investigations of acute and chronic air pollution incidents are critically evaluated, and pertinent toxicologic information is presented. Included are data on the character and amount of (1) total chemical air pollutants discovered to date, (2) 20 of the most prevalent metallic air pollutants, based on a sampling of three cities, and (3) eight of the most prominent metallic air pollutants according to area of two large industrial cities. Also noted is the significant discovery that ozone or nitrogen oxides interact with unsaturated hydrocarbons to form tissue oxidants of high irritant potency. The need is stressed for studies of contributions from soil and painted surfaces to inorganic pollution and of the nature of metallic combinations having a decided bearing on the toxicity of an inhaled metal. The effect of pollution on an urban population can best be studied by limiting the study to population groups that are homogeneous in respect to the most important variables of group susceptibility, racial constitution, population density, housing, and nutritional status.

10856 APTIC NO. 28041

Carpenter, Frank G.

ANESTHETIC ACTION OF INERT AND UNREACTIVE GASES ON INTACT ANIMALS AND ISOLATED TISSUES.

Am. JPhysiol., vol. 178:505-509, Sept. 1954. 22 refs.

To measure the depressant effect of inert gases relative to one another, the pressure required of each to protect 50% of a group of mice from electroshock convulsions was determined. Twenty to thirty animals were tested at five different pressures of each gas and the results plotted with respect to the percentage protection afforded on logarithmic probability paper. The gases included cyclopropane, dichlorodifluoromethane, ethylene, xenon, nitrous oxide, krypton, sulfur hexafluoride, methane, argon, nitrogen, and helium. Sciatic nerves from adult albino rats weighing 300-400 grams were dissected, and the effect of these gases was measured by the decrease in excitability, blockade of fiber conduction, and alteration in the polarized state of the constituent fiber membrane. At consistently higher pressures six out of seven of the gases tested diminished excitability, blocked conduction, and produced significant depolarization of isolated rat peripheral nerve. The depressant action of these substances is fundamentally related to the facility with which they dissolve in olive oil or a non-polar liquid to produce a critical concentration of molecules at their site of action. The relative solubility of a gas in olive oil or a non-polar liquid is inversely proportional to its standard state fugacity. For two gases of very high molecular weight, smaller amounts were dissolved than would be predicted by this rule and the relation between the depressant action of a gas and its fugacity is not so clear. (Author summary modified)

10857 APTIC NO. 28042

Baetjer, Anna M.

CHRONIC EXPOSURES TO AIR POLLUTANTS AND ACUTE INFECTIOUS RESPIRATOR DISEASES.

Arch. Ind. Hyg. Occupational Med., 2(4):400-406, Oct. 1950. 23 refs. (Presented at the U. S. Technical Conference on Ai Pollution, Health Panel, Washington, D. C., May 4, 1950.)

A brief summary is given of knowledge of the effects of air pollutants on susceptibility to acute infectious diseases of the respiratory tract, on the basis of published data on occupational exposures and animal experimentation. Nontoxic dusts, smoke, irritant gases and fumes, and carbon monoxide are discussed. Data obtained from studies of the health of persons who have been exposed to specific chemical contaminants of the air have not yielded any definite evidence that chronic inhalation of such chemical contaminants in low concentrations affects susceptibility to acute infections of the respiratory tract. Similarly, the few experiments which have been performed on laboratory animals have yielded chiefly negative results. However, the data available at present are entirely insufficient to enable one to draw any definit conclusions. The need for fundamental research on physiologic effects, effects on susceptibility to infectious diseases, industri morbidity, and epidemiological patterns is stressed.

10858 APTIC NO. 28046

Lassen, H. C. A., Erik Henriksen, Frits Neukirch, and Henning Sund Kristensen

TREATMENT OF TETANUS. SEVERE BONE-MARROW DEPRESSION AFTER PROLONGED NITROUS-OXIDE ANAESTHESIA.

Lancet, no. 1:527-530, April 28, 1956. 8 refs.

When the conventional treatment of tetanus with barbiturates, chloral hydrate, or bromethol does not totally suppress the spasms, or if adequate ventilation is threatened by accumulation of secretion in the upper respiratory passages, eventually followed by atelectasis, a high tracheotomy under general anesthesia preceded by oral intubation should be done and an inflatable rubber cuff-tube inserted into the trachea. Since the treatment of tetanu often has to be continued for many weeks, nitrous oxide anesthesia was used to produce a mild narcosis, avoiding the long-continued psychological strain. The first two patients treated with nitrous oxide and oxygen were cured and left the hospital without sequels, but signs of aplastic anemia developed with a 3rd patient after seventeen to eighteen days of treatment. Despite repeated blood transfusions, pronounced granulocytopenia and thrombocytopenia with severe hemorrhagic diathesis developed followed by septicemia. Electrocardiography showed pronounced myocarditis, and bone-marrow biopsy revealed severe damage to the blood forming cells. When the case histories of the first two patients were reviewed, it became clear that they also had shown signs of hematological complication. These observations and two trials have led to the conclusion that prolonged anesthesia with nitrous oxide may cause acute aplasia of the bone morrow.

10859 APTIC NO. 28071

Alpert, B. and R. Banerjee

PHOTODISSOCIATION OF CARBON MONOXIDE FROM SOME HEMOGLOBIN DERIVATIVES. A POSSIBLE CASE OF ENERGY TRANSFER.

Biochem. Biophys. Res. Commun., 42(4):608-614, 1971. 7 refs.

The photodissociation was studied of carbon monoxide bound to the divalent hemes in hemoglobin valency hybrids. A parameter proportional to the quantum yield was measured for the derivatives having the trivalent heme in the aquo of fluoride form, and compared to the same parameter for an equimolecular mixture of carboxyhemoglobin and ferrihemoglobin having identical overall absorption spectra. The presence of ferrihemes on a given type of chain was found to have a significant effect on the photoreactivity of the carboxyheme situated on the complementary chain. (Author abstract modified)

10860 APTIC NO. 28094

Freour, P., P. Blanquet, M. Bernadou, T. Nacef, P. Chomy, H. Chidler, and J. R. Mallet

STUDY OF THE PENETRATION, DISTRIBUTION AND FLUX OF AEROSOLS IN THE RESPIRATORY TRACT BY MEANS OF RADIOISOTOPES.

(Etude de la penetration, de la repartition et du devenir des aerosols dans les voies respiratoires au moyen des radioisotopes). Text in French. Poumon Coeur (Paris), 26(6):689-699, 1970. 9 refs.

The penetration, distribution and flux of an aerosol containing 1 microcurie of Au-198 per ml was studied on 3 healthy subjects by measuring the radioactivity in various zones of the lung with a scintiscanner. The pulmonary radioactivity curve as a function of duration of aerosolization manifests initially a rising tendency then reaches a stable plateau after 3 to 5 minutes depending on circumstances and the subject. The exhalation into the atmosphere and resorption of the particles adhering to the respiratory tract by the blood stream is different for sollutions and for suspensions Isotopic ventilatory scanning and animal experiments (dogs) disclosed that the aerosol micellae are preferentially deposited at the distal part of the respiratory tract. These results of the dynamics of the penetration and distribution of aerosol particles can be generally applied to all types of aerosols with constrictive or dilatory bronchial activity and thus have implications in aeroso therapy. A short intermittent administration of an aerosol repeate after the effect has faded (after the product has been absorbed) seems the best method of administration.

10861 APTIC NO. 28101

Matsumoto, Hiroshi

VARIATION OF PEAK FLOW RATE IN HEALTHY SCHOOL CHILDREN. (REPORT 2) SEASONAL VARIATION.

(Shoni no saidai kokiryuryo no hendo ni kansur kenkyu. (Dai 2 ho). Saidai kokiryuryochi no kisetsuteki henka). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 17(13):1067-1074, Nov. 1970. 30 refs.

Thirteen schoolboys and 20 schoolgirls in the second grade and 16 schoolboys and 14 schoolgirls in the sixth grade were studied for seasonal variations in respiratory function. The children were tested each morning and afternoon during the following periods: May-June (early summer), October-December (autumn) and January- March (winter). The average value for peak flow increased from early summer to winter, reaching 17 to approximately 29 l/min by winter. Daily variations for individual subjects are described by a coefficient of variation (CV), and the mean CV is 5.8 plus or minus 1.9%-10.1 plus or minus 4.6% for the second-grade group and 4.0 plus or minus 1.2%-5.9 plus or minus 2.3% for the sixth grade group. For both groups the greatest variation occurred in autumn (10.1 plus or minus 6% for the second grade and 5.9 plus or minus 2.3% for the sixth grade). Variance analysis of winter measurement indicated individual differences in sixth-grade schoolgirls and significant differences between second-grade boys and sixth-grade boys and girls. The average daily variation was larger in the second grade than in the sixth grade and especially large in autumn for both groups. There were correlations of the variance between boys and girls but no significant correlation between the second and sixth grades except in autumn. On some days, there was a marked collective increase or decrease in variance, regardless of school year. These results indicate that single or short-term measurements of respiratory function are likely to be erroneous.

10862 APTIC NO. 28103

Toyama, Toshio

A REPORT OF AN INVESTIGATION CONCERNING THE INFLUENCE OF CARBON MONOXIDE IN ATMOSPHERE ON HUMAN BODIES.

(Taikichu no issankatanso no jintai eikyo ni kansuru chosa hokoku). Text in Japanese. Keio Univ., Tokyo (Japan), Public Health Div., 18p., March 1970.

Employees of a Tokyo public transport company (250 bus drivers and 34 nondrivers with an average age of 40) were studied for the influence of carbon monoxide. Specifically, the introduction of CO into human bodies under various working conditions, reaction times, and degrees of fatigue were analyzed. From November to December 1968, expired air was collected from each subject three times a day (before work, lunch time, and at the close of the working day) and analyzed by an infrared technique. Outdoor CO concentrations were below 10 ppm; indoor concentrations were higher under the influence of heating. The average CO concentration in air expired by nonsmokers was 19.49 ppm in contrast to 26.33-34.70 ppm for smokers Carbon monoxide values did not vary with time of day but tended to increase gradually with the passage of days. There was very little difference in the amount of CO expired by drivers (28.09 ppm) and nondrivers (29.79 ppm). The higher value for the latter is attributed to the effect of indoor heating. Domestic heating appeared to affect the quantity of CO measured in the early morning. A positive correlation was found between the amount of CO in expire air and the degree of subjective fatigue.

10863 APTIC NO. 28119

Rumberg, Eckhard

DECOMPOSITION PRODUCTS AND SMOKE GENERATED BY THE ACTION OF FIRE ON PLASTICS.

(Zersetzungsprodukte und Rauchent-wicklung bei Feuereinwirkung auf Kunststoffe). Text in German. VDI (Ver. Deut. Ingr.) Z. (Duesseldorf), 113(1):20-24, Jan. 1971. 7 refs.

The thermal decomposition of plastics, the fundamentals of laboratory analysis of smoke and of combustion gases, and the products of thermal decomposition of polyolefins, polystyrol, polyvinylchloride, polymethacrylic acid ester (halogen-free), polyacrylonitrile, polyphenol resins, polyester (unsaturated interlaced with styrol, halogen-free), epoxy resins, melamine resins, polyamides, and polymethane are reviewed. Criteria for the evaluation of the harmfulness of decomposition and of combustion products include their irritating effect without or with secondary effects, their toxicity, their vision impeding effect, and, in cases of acute toxicity, the residual damage following the survival of the acute phase. The harmful effects of combustion gases are evaluated by burning the examined substance at a stipulated temperature and under stipulated air flow conditions, by exposing laboratory animals to the generated combustion products, and by observing the behavior of the animals, by analyzing their blood, and by examining their organs. It is thus possible to develop a test method for the determination of relative toxicity. The pitfalls of such a procedure are stressed.

10864 APTIC NO. 28142

Fontanges, R., P. Isoard, and G. Chatot

STUDY OF ATMOSPHERIC MICROCONSTITUTENTS AND OF THEIR BIOLOGICAL EFFECTS.

(Etude des microconstituants atmospheriques et de leurs effets biologiques). Text in French. Poumon Coeur (Paris), 26(6):659-687, 1970. 9 refs.

Results of a systematic allergological, epidemiological and cancerological study of atmospheric microconstituents (bacteria, micromycetes, and dusts) collected by means of a device aspirating 20 cu m air/minute mounted on a laboratory truck are presented. In the field of allergology, a sedimentation phenomenon was observed on the substrate of a micromycetes culture which was rhythmically influenced by seasonal climatic variations, by humidity and rain, and by substances stemming from the ground and from industrial emissions. The distribution of thes substances in turn depended on the wind direction. In the field of epidemiology, the morbidity potential of atmospheric cocci is governed by a predominating wind direction, by a particular climate, by a particular humidity level and by the true precursors of the pathogenic species whose enzymatic systems have been modifie during their stay in the atmosphere. In the field of cancerology, the collected dust particles when inhaled by mice or injected caused changes in the blood picture and in the numbers of blood corpuscles, adenomatous proliferations in the lungs and irritation of the reticuloendothelial system.

10865 APTIC NO. 28164

Mizuno, Hiroshi

REPORT OF RESEARCH ON EFFECTS OF AIR POLLUTION ON THE HEALTH OF CITIZENS OF NAGOYA.

(Taiki osen ga Nagoya shimin no kenko ni oyobosu eikyo ni kansuru chosa hokoku). Text in Japanese. Nagoya Univ. (Japan), Dept. of Public Hygiene, 88p., 1969.

Although the degree of air pollution in Nagoya as a whole is still low, the situation in the industrial area of the city is deteriorating. This was demonstrated by the results of a survey of the health effects of waste gases from petroleum combines and other sources. In the polluted area, there were increased deaths due to respiratory diseases among men and women over 70. The correlation between the male death rate and sulfur dioxide concentrations was 0.60–0.70 for men over 50. Symptoms of respiratory infections were one and one-half to two times more frequent than in nonpolluted areas, and there were more individuals who caught five or more colds a year. Women 40-60 years old who had lived in the area for more than five years showed reduced lung function. In addition, the polluted area had increasing infant mortality rates in contrast to the reduction noted for other areas. Residents of the industrial area complained mainly of odors and were able to identify their exact sources. The residents appeared to rely on the national and local governments for a solution, not realizing that they themselves could initiate action.

10866 APTIC NO. 28169

Kimura, Kikuji

INFILTRATION OF SO2 INTO THE TRACHEA--EFFECT OF EXISTENCE OF PARTICULATES WITH GASEOUS MATTER.

(SO2 no kidonai shinnyu -- ryujobutsu kyoson no eikyo). Text in Japanese. Rodo Kagaku (J. Sci. Labour, Tokyo), 25(10):40-43, Oct. 1970.

A trachea model was used to study the penetration of inhaled sulfur dioxide alone or in the presence of particulates. The trachea model, which had a moist inner wall and whose bottom half was immersed in water, had an air volume of about 400 cu cm. The dimension of the inner wall was about 700 sq cm and air velocity was 23.7 cm/sec at a suction speed of 10 l/min. The experiments conducted show that the penetration rate of SO2 increases in the presence of particulates and that its effects on the respiratory tract are greater under this condition. In the presence of particulates, especially deep SO2 penetration into the trachea was observed at increased respiration rates. These observations suggest that the effects of inhaled SO2 should be greater when it takes the form of sulfuric acid mist.

10867 APTIC NO. 28170

Tsuchiya, Kenzaburo

ENVIRONMENTAL POLLUTION BY HEAVY METALS SUCH AS LEAD.

(Namarito jukinzoku miyaru kankyo osen). Text in Japanese. Rodo Kagaku (J. Sci. Labour, Tokyo), 25(10):4-10, Oct. 1970. 43 refs.

Although there has been a decrease in the incidence of occupational lead poisoning, the appearance of porphobilinogen, delta ALA, and similar diseases, is being observed with increasing frequency. This suggests the necessity of developing a method for the rapid diagnosis of the lead load being accumulated in the body as a result of increased atmospheric concentrations. This problem is not simple in the absence of proof that lead in urine indicates the degree of exposure to lead and that lead in blood indicates the lead accumulation in the body. Studies must be undertaken to determine the effects of small amounts of all lead compounds on a large population and also the interaction of lead with other metals. Only when all relevant data are scientifically sorted and utilized will it be possible to establish an environmental standard for lead.

10868 APTIC NO. 28171

Akatsuka, Kyoji

PROBLEMS OF HYGIENICS CONCERNING LEADED GASOLINE.

(Kaen gasorin nikansuru eiseigakuteki mondaiten). Text in Japanese. Rodo Kagaku (J. Sci. Labour, Tokyo), 25(10):20-31, Oct. 1970. 55 refs.

The toxicity of hydrocarbons is explained on the basis of clinical data and experimental data for men and/or animals. Symptoms of acute poisoning due to absorption of hydrocarbons include headaches, dizziness, insomnia, anxiety, and delirium; symptoms of acute poisoning due to skin irritation include conjunctivitis and coughing. Among the symptoms of chronic poisoning are inertia ennui, headaches, melancholy, and insomnia. The most marked effects are due to gasolines, particularly those that have undergon thermal cracking. Animals whose skins have been exposed to hydrocarbons have developed necrotic lesions and have not survived as long as animals absorbing gasoline. The pathological effects of hydrocarbons on animal organs are greatest in the case of leaded gaolines, which suggests that maximum allowable concentrations of lead should be determined. In addition, observation facilities and personnel should be increased.

10869 APTIC NO. 28175

Ogata, Masana, Katsuaki Okuma, Junko Omori, and Suzuko Ueki

THE RESULTS OF THE INVESTIGATION OF ODORS IN MIZUSHIMA DISTRICT.

(Mizushima-chiku ni okeru akushu chosa seiseki). Text in Japanese. In: An Outline of Countermeasures Against Public Nuisance in Kurashiki City. (Kurashiki-shi ni okeru kogai taisaku no gaiyo). Kurashiki Municipal Office (Japan), Dec. 1968, Chapt. 6-(12), p. 144-155.

Complaints about odors in the Fukuda, Tsurashima, Mizushima and Kojima districts of Kurashiki City (Okayama Prefecture) were investigated by means of questionnaires sent to families of junior-high schoolboys. In addition, measurements of ammonia and organic matter in air and water were carried out in the first three districts. The rates of complaints were 6.0% for the Fukuda district, contiguous to factories, 4.6% for the former Kurashiki City, and 4.3% for the Mizushima district. In the Tsurashima district, 32.24% of the complaints centered on one odor. In all districts, more than 10% of the respondents complained about the odor of gases, ammonia, gasoline, vinegar, rotten onions, burning matches, and burning rubber. On one day ammonia concentrations in Fuduka ranged from 0.11 ppm to 0.25 ppm. In increasing odor of frequency, subjective symptoms were headache, sore throat, eye irritation, coughing, and nausea, Organic matter found in Mizushima was observed in all water basins.

10870 APTIC NO. 28196

Robson, J. G., B. Delisle Burns, and P. J. L. Welt

THE EFFECT OF INHALING DILUTE NITROUS OXIDE UPON RECENT MEMORY AND TIME ESTIMATION.

Can. Anaesth. Soc. J., 7(4):399-410, Oct. 1960. 17 refs.

To determine the effect of nitrous oxide on memory and time estimation, twelve human subjects between the ages of 27 and 44 and young cats were exposed to a weak mixture of nitrous oxide (10-40%) in oxygen. Humans breathing 30-40% N2O are not able to retain and recall new information for a period exceeding two or three minutes. When breathing 10-40% N2O, both human subjects and cats estimated time as passing more slowly than did the same subjects breathing oxygen or air. In humans, deviation from the normal time sense increases with an increasing dose of the anesthetic. Whatever the mechanism by which the passage of time is assessed, it is clear that memory plays an essential part. It was not determined whether amnesia is invariably associated with a disturbance in time sense. Possible mechanisms of time sense were not discussed.

10871 APTIC NO. 28199

Stokinger, H. E.

TOXICOLOGY OF CHEMICAL AIR POLLUTANTS.

Chem. Can., 5(1):23-26, 36, 44, Jan. 1953. 37 refs.

A brief summary of available semi-quantitative information on the major group constituents of industrial atmospheres, concentration of metallic elements in urban atmospheres, and concentrations of elements by type of urban district is presented in table form. Distinct seasonal variations are noted. Bodily intake of solid particles (and possibly of oil droplets as well) is affected primarily by particle size, especially for insoluble particles, whereas solubility governs the amount of gases and vapors retained in the body. The volume of air inhaled is affected by type of physical activity. Once inhaled, the behavior of inorganic substances in the body depends on whether the metal salts remain in solution in ionic dimensions, or whether they precipitate to colloidal forms. The former are distributed uniformly to all body tissues and then are uniformly deposited in bone; the latter are entrained to certain organs (e.g., liver, spleen) or deposited in bone in spotty distribution. The toxicologic effects of certain chemical air pollutants are reviewed sulfur dioxide, sulfur trioxide, hydrogen fluoride, and sulfuric acid mist; arsenic and arsine; smog ingredients; beryllium; cadmium; and fluorine and its compounds.

10872 APTIC NO. 28205

Gaultier, M., P. Gervais, P.-M. de Traverse, P.-E. Fournier, N.-L. Coquelet, A.-M. Loygue, and H. Housset

GENETIC VARIATIONS IN THE HEMOBLOGIN CAUSED BY THE PROFESSIONAL ENVIRONMENT.

Arch. Maladies, Profess. Med. Trav., Security Sociale, 29(4-5):197-203, April-May 1968. 19 refs. Translated from French. Belov and Associates, Denver, Colo., 14p., Nov. 13, 1970.

Qualitative hemoglobinopathia and thalassemic syndromes have become very frequent in the Paris region due to immigration of workers of Mediterranean or African origin, working under conditions such as exposure to benzene, lead, or ionizing radiation The irregularities most frequently discovered are hemoglobins S and C on the one hand, thalassemia on the other hand. These red blood corpuscle irregularities sometimes pose diagnostic problems because of the presence of red blood corpuscles of basophilous granulations in lead poisoning and in thalassemic syndromes. The existence of a hemolytic process and aplasic attacks, in the course of different toxic hemopathia and in hemoglobinopathia, has lead numerous authors to eliminate the subjects carrying hemoglobin irregularities from any work which could possibly involve the danger of exposure to a hemotoxic substance. Comparative studies of toxic environment and hemotological functions of subjects carrying red blood corpuscle irregularities would be desirable in order to justify the professional classification of populations where red blood corpuscles variations are numerous. (Author summary modified)

10873 APTIC NO. 28213

Fishbein, Morris

RUSSIAN IDEAS ON LUNG CANCER.

Postgrad. Med., 35(2):559-560, May 1964. 1 ref.

A Russian specialist is convinced that atmospheric pollution, especially the increased concentration of 3,4-benzpyrene in urban air, plays a part in the increase in the incidence of lung cancer. Contributing etiologic agents lung cancer are assumed to be irritant carcinogens coming in contact with bronchial tube tissues that have been damaged by inflammation such as bronchitis. It is hypothesized that decomposition of the mucosa and pulmonary tissue during a disease associated with inflammation may release intracellular fats which could then act as solvents for carcinogeni substances. Means of preventing lung cancer include green belts, filters on cigarettes and motor-car exhaust pipes, and control of influenza and chronic bronchitis.

10874 APTIC NO. 28215

Eckardt, Robert E.

AIR POLLUTION, LUNG CANCER, AND CHRONIC LUNG DISEASE.

J. Occupational Med., 6(4):184-188, April 1964. 24 refs.

Reports throwing doubt on the causal relationship between air pollution and lung cancer or chronic pulmonary disease are summarized. These reports indicate that the association between lung cancer and chronic lung disease and smoking is far stronger than any associations between the two conditions and air pollution. Some studies also suggest that the elimination of auto exhaust might not influence lung cancer rates, which are predicted by a 1961 statistical study to go down even if air pollution is not reduced.

10875 APTIC NO. 28216

Ozkaragoz, K.

POLLENS, MOLD SPORES, AND OTHER INHALANTS AS ETIOLOGIC AGENTS OF RESPIRATORY ALLERGY IN THE CENTRAL PART OF TURKEY.

J. Allergy, 40(1):21-25, July 1967. 13 refs.

The results if skin tests with 25 pollens, 9 mold spores, and 8 inhalants in 130 children with respiratory allergies are reported The patients were first subjected to the scratch test, and those who showed negative reactions were retested with the intradermal test. Three tables comparing the results of scratch and intradermal tests are included. The most important etiologic agent of respiratory allergies was house dust. The pollens were next in importance. Among pollens, grasses had first place, weeds second, and trees third. Mold spores and other inhalants were of secondary importance. All patients were found to have multiple sensitivities to various groups of allergens and to seasonal environmental inhalants. (Author abstract modified)

10876 APTIC NO. 28219

Wilson, Rex H. and William E. McCormick

PLASTICS THE TOXICOLOGY OF SYNTHETIC RESINS.

A.M.A. Arch. Ind. Health, 21(6):536-548, 1960. 114 refs. (Presented at the Industrial Health Conference, Chicago, Ill., April 30, 1959.)

This compilation of the literature on the toxicity of synthetic resins is an up-dating of a paper originally written in 1954 and first revised in 1955. In this revision, the resins are grouped into the following general classes: acrylic resins, alkyd resins, amino (urea and melamine) resins, cellulose plastic materials, coumarone-indene resins, epoxies, fluorocarbons, nylon, phenolic resins, polyethylene, polyester resins, silicones, polystyrene, vinyl resins, and polyurethanes. Major findings within these categories are summarized.

10877 *APTIC NO. 28241*

Desbaumes, P.

FATAL POISONING BY SILO GASES (CARBON MONOXIDE AND OXIDES OF NITROGEN).

(Intoxications mortelles par les gaz de fermentation de silos agricoles (oxyde de carbone et oxydes d'azote)). Text in French. Arch. Toxikol. (Berlin), 23:160-164, 1968. 3 refs.

Two cases of fatal intoxication by silo gases are described, as well as analytical methods and the results of the determination of carbon monoxide and nitrogen oxides to confirm the clinical diagnosis. In addition, gas phase partition chromatography showed the presence of 20% carbon dioxide. (Author summary modified)

10878 APTIC NO. 28242

Grayson, R. R.

SILAGE GAS POISONING: NITROGEN DIOXIDE PNEUMONIA, A NEW DISEASE IN AGRICULTURAL WORKERS.

Ann. Internal. Med., 45: 393-408, Sept. 1956. 25 refs.

Silage gas poisoning due to oxides of nitrogen is essentially a diffuse chemical bronchopneumonia caused by the irritating action of nitrous and nitric acids on the respiratory tree. The disease may be mild or severe, depending upon the degree of exposure. Two cases of silage gas poisoning are presented, one of which was fatal. Special studies done on the corn ensilage and on the actual gas from the silo in which the two patients were poisoned proved that there was a poisonous concentration of the oxides of nitrogen. This condition was due to a combination of drought, high-nitrate soils and an unventilated silo. The literature on silage gas poisoning and the industrial and agricultural literature on the toxicology of nitrogen oxides and on silos and toxic ensilage are reviewed. Silage gas poisoning due to the oxides of nitrogen with the production of chemical pneumonia is a disease which probably occurs more commonly than is recognized. Physicians in rural areas should be aware of the possibility of this disease during summer periods when corn is being placed in silos, particularly during times of drought. No specific treatment is known for the resulting bronchopneumonia. Research should be directed toward the discovery of a specific therapy. (Author summary modified)

10879 APTIC NO. 28243

Caughey, Winslow S.

PORPHYRIN PROTEINS AND ENZYMES.

Ann. Rev. Biochem., 36:611-644, 1967. 383 refs.

The structure, characterization, and function of primarily mammalia and yeast hemeproteins are reviewed. Reasons for rejecting the crystallographic evidence for the absence of an aquo ligand in myoglobin are considered. Reactions of iron (II) porphyrins with oxygen and carbon monoxide have been shown to be markedly sensitive to the electron withdrawing power of substituent groups at the periphery of the porphyrin ring and also to the basicity of trans ligand. The role of the distal histidine in oxygen bonding is cited. Binding sites within the sperm whale myoglobin, the ethyl isocyanide adduct, and horse myoglobin are considered. The polypeptide chain which is probably a characteristic feature of all vertebrate myoglobins and hemoglobins is folded so that the interior of the molecule is almost exclusively filled with hydrophobic groups. In all the derivatives so far studied in full detail, the porphyrin ring system is not planar but slightly concave towards the iron atom's sixth coordination position, with the iron at least 0.3 A from the best porphyrin plane; the direction of the displacement of the iron is towards the proximal histidine residue. Heme-protein interactions, non-iron binding sites, and ligand binding to iron are discussed; absorption spectra magnetic properties are cited. Normal mammalian hemoglobins have three particularly important properties: a low oxygen affinity; a sigmoid shape of the oxygen dissociation curve, described as heme-heme interaction; and a pH dependence, the Bohr effect. Structural alteration of hemoglobin upon oxygenation is considered, as well as ligand binding to iron and heme-protein interactions. Hemoglobins M are characterized by a tendency of two abnormal subunits to remain as an unusually stable methemoglobi derivative, because of either ready autoxidizability or an unusual resistance to the methemoglobin reductase system of the erythrocyte The reaction of cytochrome c oxidase necessarily involves the transfer of four electrons and four protons to each oxygen molecule two copper atoms and two hemes, each in a different environment, undergo reversible oxidation and reduction. The oxidase reaction also is linked to mitochondrial phosphorlylation. As well as other hydroperoxidases, the properties and reactions of cytochrome c peroxidase are considered. Catalase is inhibited by 2 ethylthioisonicotinamide, and by ascorbate and copper (II), which interact to form a free radical which is considered a probabl participant in the inhibition. Structure and property relationships of b-type cytochromes and cytochrome c are also considered.

10880 APTIC NO. 28245

Stumphius, J. and P. B. Meyer

ASBESTOS BODIES AND MESOTHELIOMA.

Ann. Occupational Hyg., 11(4): 283-293, Oct. 1968. 26 refs.

The relation between exposure to asbestos and the occurrence of neoplasia is reviewed. Typical asbestos initiated tumors--pleural and peritoneal mesothelioma--were found at an unusually high frequency in shipyard workers. Only slight asbestos exposure had taken place in these cases. On the other hand, the persons involved (flame cutters and welders), had been exposed to high concentrations of iron oxide, and objects similar to asbestos bodies were found in their lungs. Originally it was thought that these were pseudo asbestos bodies, containing an iron oxide core, and it was suspected that pseudo asbestos bodies might play a part in the genesis of the tumors. Experiments are described which showed that the kernel of the bodies contained asbestos of the amphibole type, thus proving that they were not pseudo but normal asbestos bodies. The simultaneous exposure to low concentrations of asbestos and high concentrations of iron oxide raises the suspicion that iron oxide might be an important cofactor in the genesis of mesothelioma found in the shipyard workers. (Author abstract modified)

10881 APTIC NO. 28246

Wright, George W.

ASBESTOS AND HEALTH IN 1969.

Am. Rev. Respirat. Disease, 100(4):467-479, Oct. 1969. 52 refs. (Presented at the American Thoracic Society, Annual Meeting, Miami Beach, Fla., May 25, 1969.)

As reviewed in 1969, the role of asbestos in augmenting the incidence of bronchogenic cancer among asbestos workers appears to be dose-related, may be dependent on the specific category of the fiber, especially in relation to the degree of effect, and seems to be that of a cocarcinogen. With regard to mesothelioma, its strikingly rare occurrence among the general public strongly suggests that there is a tolerable level of airborne asbestos filter which does not cause an undue risk of mesothelioma. This tolerable level is assumed to be substantial considering the degree of genuine occupational exposure that can be tolerated without increased risk of the disease. Although a scant number of ferruginous bodies have been demonstrated in lungs from the general public, there is no clear-cut evidence that these are the result of exposure to asbestos fiber rather than to many other materials known to be capable of producing ferruginous bodies. A study of fiber populations in ambient air is necessary to identify the central core of ferruginous bodies and to obtain quantitative data on which to base meaningful conclusions. There is reason to believe that the occupational use of asbestos can be safely controlled.

10882 APTIC NO. 28247

Breslow, Lester

ENVIRONMENTAL CARCINOGENESIS.

Calif. Med., 101(5):371-375, Nov. 1964. 20 refs. (Presented at the American Medical Association, Clinical Session, Los Angeles, Calif., Nov. 27, 1962.)

Environmental carcinogenesis is examined from the standpoints of universal exposure, selective exposure of groups of persons, personal exposure, and the possible transmission of virus as an etiologic factor in cancer. Exposure to sunlight, which induces skin cancer in fair-skinned people, is perhaps the most ubiquitous environmental cancer-producing situation. Atmospheric pollution by radioactive debris is another clearcut example of exposure of entire populations to a carcinogenic agent. This debris carries the hazard of bone cancer and leukemia. Similarly, hydrocarbons, heavy metals, and other substances present in urban air may be a factor in lung cancer. An example of selective exposure to a carcinogenic agent is the high rate of death from leukemia among radiologists; another type of selective exposure is the therapeutic use of X-radiation. The outstanding example of personal exposure is tobacco smoking, which is probably the major factor in the rise of lung cancer. Experimental data support the idea that viruses are the etiologic agents of most cancer. An atack on physical and chemical agents of cancer requires the identification of all agents, the development of control technology, and social action to put the solution into effect.

10883 APTIC NO. 28248

Cosmi, Ermelando V. and Gertie F. Marx

ACID-BASE STATUS OF THE FETUS AND CLINICAL CONDITION OF THE NEWBORN FOLLOWING CESAREAN SECTION.

Am. J. Obstet. Gynecol., 102(3):378-382, Oct. 1, 1968. 13 refs.

Fetal acid-base status and neonatal clinical condition were assessed in 34 consecutive elective cesarean sections to compare the effects of spinal block with hydration to those of thiopental-nitrous oxide-succinylcholine anesthesia. Spinal analgesia with prophylactic hydration produced more favorable biochemical and clinical conditions than spinal analgesia with therapeutic hydration. Apgar scores indicated that the thiopental-nitrous oxide-succinylcholine sequence was associated with a higher incidence of neonatal depression than either of the spinal analgesia groups; this, however, was not accompanied by an increase in acidosis of the neonate. (Author abstract modified)

10884 APTIC NO. 28253

Dean, Geoffrey

LUNG CANCER IN SOUTH AFRICANS AND BRITISH IMMIGRANTS.

Proc. Roy. Soc. Med., vol. 57:984-987, Oct. 1964. 10 refs.

British immigrants to South Africa were observed to have higher lung cancer mortality rates than locally-born white men. The lung cancer mortality rates of South African-born white men living in rural areas and smoking 1-20 cigarettes a day were only a little higher than those of non-smokers. However, men emigrating from Britain to South Africa had a mortality rate 21% lower than the men they left behind, while at the same time their daily cigarette consumption in South Africa was approximately 75% higher. Men and women emigrating from England and Wales to Australia and the United States had lower lung cancer mortality rates than men and women in England and Wales. Various possible explanations are discussed. It is suggested that the damp, cold climate and overcrowded living conditions of Britain and the Channel Islands, with the repeated respiratory infections that result, contribute very considerably to the differences between lung cancer rate of these areas and South Africa.

10885 APTIC NO. 28266

Carson, Theophilus R., Mitchell J. Rosenholtz, and Frank T. Wilinski

THE RESPONSES OF ANIMALS INHALING NITROGEN DIOXIDE FOR SINGLE, SHORT-TERM EXPOSURES.

Air Force Systems Command, Wright- Patterson AFB, Ohio, Biomedical Lab., ASDR-61-525, 11p., Oct. 1961. 18 refs.

NTIS, DDC: AD 268216

Experiments were conducted to study the effects of nitrogen dioxide at various concentrations below the lethal concentration 50 for single, short-exposure periods, to obtain concentrations causing minimal effects to animals. Rats and rabbits were exposed in a test chamber for 5-60 min and the LC50's calculated. In addition, rats and dogs were exposed for single 5-60 min periods to concentrations below the rat LC50's. Gas analysis was by the Saltzman colorimetric method. Toxic signs, pathologic changes in the lung, and lung-to-body weight ratios correlated directly with the severity of exposure to NO2. Dogs showed only mild toxic signs at concentrations causing pulmonary edema in rats. Based on the lung-to-body weight ratios and pathologic changes found, the concentrations of NO2 at which minimal effects were manifested were 104, 65, and 29 ppm for 5, 15, and 60 min, respectively. From this information, estimates may be made for saf exposure concentrations of NO2 to man at various exposure times. (Author abstract modified)

10886 APTIC NO. 28269

Freeman, G., S. C. Crane, R. J. Stephens, and N. J. Furiosi

THE SUBACUTE NITROGEN DIOXIDE-INDUCED LESION OF THE RAT LUNG.

Arch. Environ. Health, vol. 18:609-612, April 1969. 18 refs. (Presented at the American Medical Association Air Pollution Medica Research Conference, Denver, Colo., July 23, 1968.)

Because of its presence in both smog and tobacco smoke, observation were made of how the rat lung responds to the presence of nitrogen dioxide. Rats grew normally and survived natural lifetimes in an atmosphere containing 0.8 plus or minus

0.2 ppm NO_2, but they consistently exhibited a moderate degree of tachypnea without apparent distress. A similar group was exposed for about two years to 2 plus or minus 1 ppm, with similar results. However, the second group appeared to retain some air and weighed about 20% more than control lungs. By light and electron microscopy, the bronchiolar epithelial cells proved to be broader and more uniform than in controls; there were fewer exfoliating cells and blebs. Cilia were either reduced or absent. Effects of a defective ciliary cleansing mechanism and a relatively inactive epithelial layer are indicated. At levels of 10 plus or minus 1 to 25 plus or minus 2 ppm of NO_2, rats developed large, air-filled, heavy lungs without edema or increased blood volume, and eventually died. The development of emphysema-like lungs was accompanied by enlargement of the thoracic cage with dorsal kyphosis. A cellular description is provided.

10887 APTIC NO. 28270

RESEARCH RECOMMENDED FOR PROJECT CLEAN AIR.

In: Project Clean Air Vol. 2. California Univ., p. 3-1 to 3-5, 1970.

Research work recommended for Project Clean Air is presented. The health effects of present and future modes of transportation should be evaluated in terms of characterization of pollutants, experimental biomedical studies, and epidemiologic surveillance of populations. The health effects of present and future stationary source pollution should be studied, particularly for pulp and paper plants, oil refineries, smelters, power plants, kilns, and agricultural operations. Permanent air pollution response surveillance systems covering both the general population, sensitiv groups, and special areas or activities, such as freeways and auto driving, should be developed. Adequate monitoring for pollutants should be developed and installed where measurements relevant to human exposure can be made. A laboratory for the detection and prediction of pollutants causing cancer, chromosome damage, and birth defects, such as hydrocarbons, cigarette smoke, metals and others, is necessary. An investigation of pollutant interaction with cell chemistry is a logical basis for providing protection from air pollution. Support for the study of short-term and long-term health effects of exposure to air pollutants is essential if chronic diseases are to be recognized and prevented. The extent and cost of the effects of air pollution on human performance, mental and emotional well-being, and accidents need to be defined. Modeling of air pollution-health effects interactions is required as a basis for coordinating research and setting priorities.

10888 APTIC NO. 28273

Propst, A.

POISONING WITH NITROGEN OXIDES.

(Ueber die Vergiftung mit nitrosen Gasen). Text in German. Wien. Med. Wochenschr., vol. 110:591-596, July 9, 1960. 22 refs.

A case history of lethal poisoning with nitrogen oxides which occurred during the cleaning of a waste water pit in the pickling department of a steel mill is reviewed. Death by pulmonary edema occurred 66 hours following the accident. The gases affected the lungs locally, primarily in the alveolar epithelium and respiratory bronchioles where they caused swelling, necrosis, capillary damage, the formation of thrombi, and edematization. Precipitous regeneration processes were induced in the epithelium by the poisoning followed by cellular death. As a result of primary epithelial damage, strong nuclear proliferation, and secondary cellular destruction, an unusual mass of chromatin and of clumps formed in the lungs, a manifestation characteristic of protracted cases of nitrogen oxide and phosgen poisonings. The principal damage is caused by the corrosive action of nitric acid on pulmonary tissues together with general toxic manifestations, vascular dilatation, stasis, fatty degeneration of the liver, and purpura cerebri induced by the formation of nitrogen oxide hemoglobin and of nitrite.

10889 APTIC NO. 28275

Gohlke, R. and H. Zenk

HISTOLOGICAL-HISTOPATHOCHEMICAL FINDINGS OF NASAL MUCOUS MEMBRANES IN RABBITS EXPOSED TO CARBON DISULFIDE.

(Histologisch- histotopochemische Befunde der Nasenschleimhaeute bei schwefelkohlenstoffexponierten Kaninchen). Text in German. Arch. Klin Exp. Ohren, Nasen, Kehlkopfheilkunde, vol. 190:36-48, 1968. 38 refs.

Nasal mucous membranes of 12 rabbits periodically exposed to carbon disulfide over a period of 1 1/2 years, and of 13 control rabbits, were tested with various stains and by a number of histochemical and enzymatic histotopchemical reactions. The tests designed to localize neutral and acid mucopolysaccharides, succinate and lactate dehydrogenase, unspecific acid phosphatase, alpha-naphthylacetate esterase, as-acetate-esterase, 5-nucleotidase, and phenolic groups frequently yielded stronger reactions on test animals but close topographic agreement with test substances of the mucous membranes from unexposed rabbits.

10890 APTIC NO. 28276

Brown, Ethan Allan and N. John Colombo

THE ASTHMOGENIC EFFECT OF ODORS, SMELLS AND FUMES.

Ann. Allergy, 2:14-24, Jan.-Feb. 1954. 28 refs.

Some of the nasal and pulmonary effects of odors, fumes, and smells are described. A questionnaire was devised to uncover patients in whose illness the effects of osmyls might play a significant part. It was noted that approximately 85% of asthmatic patients are not markedly affected by odors, fumes, smells, or drugs. Those who are, report such effects as varying from slight annoyance to major symptoms, sometimes persisting for days, with freedom following changes of environment or elimination of odor, and exacerbation with re-exposure. In some patients there is only irritation of the nasal mucosa. In others, there may be sensations of laryngeal constriction. In more severely affected patients, there may be a chronic cough which progresses into a reflex type of bronchospasm, extremely resistant to treatment, especially when exposure is persistent. Predisposition evidently plays some part in the syndrome. Specificity is also a feature, the patient responding to all of one type of odor, or to several groups of odors, with others causing no difficulty. If such responses were entirely reflex, and due to mucosal, non-allergenic sensitivity, any sharp or acrid smell should cause difficulty, but this is not the case. Seven brief case histories are given.

10891 APTIC NO. 28280

Lieben, Jan and Harry Pistawka

MESOTHELIOMA AND ASBESTOS EXPOSURE.

Arch. Environ. Health, vol. 14:559-563, April 1967. 14 refs. (Presented at the International Cancer Congress, 9th, Tokyo, Japan, Oct. 1966.)

Forty-two cases of mesotheliomas reported from 152 hospitals over a five year period were studied with regard to exposure to asbestos. Survivors or employers, or both, were questioned regarding the possibility of asbestos exposure. Ten patients actually worked in asbestos plants, eight lived or worked close to an asbestos plant, and three patients were family members of asbestos workers. In ten patients a history of assumed exposure to asbestos was obtained after prolonged questioning. In 11 other patients no history of asbestos exposure could be obtained. Criteria for diagnosis of mesothelioma are mentioned. (Author summary)

10892 APTIC NO. 28283

Stein, Marvin and Perry Ottenberg

ROLE OF ODORS IN ASTHMA.

Psychosom. Med., 21(1):60-65, 1958. 22 refs. (Presented at the American Psychosomatic Society, Annual Meeting, Atlantic City, N. J., May 5, 1957.)

A two-part study was conducted to determine the role of odors in asthma. In the first part, 25 asthmatic patients were asked if odors precipitated their attacks and the odors named were classified under one of three categories: food, cleanliness uncleanliness, and romance. In part two, another group of 20 asthmatic patients and a group of 19 healthy patients were asked for their associative reactions to 19 common odorous substances. Their responses were classified as before but a fourth category, blocking of association, was added. Twenty-two of the 25 asthmatic patients cited odors as asthma-precipitating factors, the majority of the substances mentioned falling in the Cleanliness-uncleanliness category. Similarly, for both asthmatic and healthy groups, the largest incidence of associative response to odors was in the cleanliness-uncleanliness category. The asthmatic population, however, had a significantly greater number of blocks of association per case than the healthy group. It is suggested that the frequent use of a 'perceptual' type of blocking by asthmatic patients may be an attempt to avoid stimulation of unresolved infantile conflicts. A respiratory reflex is described which has the purpose of denying further access of odors to the lungs. The hypothesis is presented that asthma in some patients is related to this respiratory reflex and that the attack is a means of physiologically defending against the activation by odors of unresolved childhood conflicts.

10893 APTIC NO. 28319

Pickroth, G.

PROBLEMS OF AEROSOL PRODUCTION AND APPLICATION.

(Probleme der Aerosolerzeugung und-anwendung). Text in German. Med. Klin. (Munich), 66(9):307-310, 1971. 2 refs.

Problems encountered in aerosol production and application relate to particle size, particle density and number, dosage, and method of sedimentation. Jet atomization has the disadvantage of producing particles that penetrate into the lungs. The dosing of the mist is inaccurate. Compressed gas atomization has the disadvantage that the aerosols do not penetrate far enough into the lungs. Ultrasonic atomization permits production of large quantities of mist in a relatively short time. The density is so large that large quantities of aerosols are inhaled in short periods of time. The greatest problem encountered is that of dosage, but there are indications that a solution is near.

10894 APTIC NO. 28321

Takhirov, M. T.

CONDITIONS OF CERTAIN IMMUNOLOGICAL AND BIOCHEMICAL REACTIONS IN ORGANISMS OF CHILDREN UNDER ATMOSPHERIC POLLUTION.

(Sostoyaniye nekotorykh immunobiologischeskikh i biokhimicheskikh reaktsiy organizma detey pri zagryaznenii atmosfernogo bozdukha). Text in Russian. Med. Zh. Uzbekistana, no. 7:21-22, 1970.

A study was made of 461 children in the 3rd through 7th years of school, 261 living within 0.2-1 km of an industrial establishment, and 200 controls. Children in the polluted area showed an average phagocytic index 1.1 below that of the controls. Children living closest to the pollution sources (700 m or less) showed a phagocytic index of 32.0, while those living in the 700-1000 meter range had an average phagocytic index of 40.0, and an inverse correlation between phagocytic function, general susceptibility to sickness was established. Positive correlation was established between pollution level and whole-blood cholinesterase activity: there was a 20.5% increase in activity in children subject to pollution.

10895 APTIC NO. 28333

Humperdinck, C.

LUNG AND OCCUPATIONAL CANCER.

(Lunge und Berufskrebs). Text in German. Med. Welt, 22(12):459-464, 1971. 22 ref. (Presented at the Internationalen Seminar fuer Krebsprophylaxe, Rome, Oct. 4-6, 1968.)

Arsenic, chromates, asbestos, tar products, nickel or nickel carbonyl (England), and isopropyl oil (U.S.A.) are known carcinogens. However, no lung cancer attributable to nickel or idopropyl oil has yet been reported in West Germany. Arsenic induced cancer is found mostly among vintagers who came in contact with arsenic-containing insecticides. Hardly any cases of lung cancer have been reported for arsenic exposure in industrial plants. Cancerous growths in several body organs e.g., lung, intestines, and bladder, have been caused by exposure to benzidine, naphthylamine, and diphenyl compounds. Lung cancer occurs in frequently among silicosis patients, but is found among asbestosis patients. Limited investigations in coking plants in 1951 revealed no higher rates of lung cancer or cancer of the bladder among plant workers. Nevertheless, concentrations of polycyclic carcinogenic aromatics in waste gases of coke batteries can be very high. Between 1072 and 1132 micrograms/100 cu m air have been measured. Considering that man inhales about 480 liters of air/hr, the great risk for such workers cannot be overlooked.

10896 APTIC NO. 28351

Shimizu, Tadahiko and Yoshizo Tsunetoshi

EQUATION OF THE PREVALENCE OF CHRONIC BRONCHITIS--EFFECTS OF AIR POLLUTION.

(Manseikikanshien yushoharitsu no hoteishiki---taikiosen no eikyo no okisa). Text in Japanese. Seijinbyo (Adult Dis.), 10(1):61-70, Sept. 1969.

The prevalence of chronic bronchitis 13,100 persons 40 years of age or more who lived in six districts in Osaka was theoretically examined. The equation of the prevalence was derived from age, amount of cigarettes smoking, and degree of air pollution. Values calculated from the equation were compared with actual ones. The diagnosis of chronic bronchitis was based on Fletcher's definition. The equation derived from amount of smoking and age was y equals 0.0001 .3N(x minus

20) squared (I) where N is the amount of smoking per day; x, the age; and y, the prevalence of chronic bronchitis(%). The equation derived from sulfur trioxide content, as measured by the PbO2 method, was y, equals 1.94 alpha plus 0.71 (II) where alpha is SO3 content; y the corrected prevalence. To exclude the influence of smoking and age on the prevalence of chronic bronchitis, these values were corrected to standard values, and the prevalence calculated from them was designated corrected prevalence. The equation of the prevalence of chronic bronchitis, y equals 0.0001 .3.N(X-20) squared plus 1.94 alpha minus 3.18, was calculated from equations I and II where for female nonsmokers N equals 4; for male nonsmokers equals N equals 8; for 1-10 cigarettes;day; N equals 10; for 11-20 cigarettes/day, N equals 20; more than 21 cigarettes per day N equals 30. The difference between calculated and actual values was 0.2%. The minimum value of alpha is discussed.

10897 APTIC NO. 28364

Inokawa, Takao and Michiko Taga

RELATIONS BETWEEN METEOROLOGICAL CONDITIONS AND DEATH. REPORT 15.

(Kisho joken to shibo tono kankei. Dai 15 ho). Text in Japanese. Nippon Ika Daigaku Zasshi (J. Nippon Med. School), 37(5):376-382, Oct. 1970. 20 refs.

The relationship between weather (fine, cloudy, rainy) and death rates was examined by classifying 42,293 deaths according to date of death, sex, age, and cause of death. The death figures were for Tokyo residents who died between January 1, 1962 and December 31, 1962. In the examination, the death rate of 100,000 population/day was sought and an average daily death rate (i.e., a death rate index) according to weather category was obtained. Death rates in terms of weather were highest on fine days and loest on rainy days. Death rates in terms of age were higher on fine days than on rainy days except for the 35-45 yr group. Death rates were higher on cloudy than on rainy days, excepting 5-20 yr and 35-45 yr groups, but lower than on fine days. Death rates in terms of sex, judged from weather were always higher among males especially among young and old men. As to death rates in terms of causes, 81.37% had higher rates on fine and cloudy days. The death rate increased when fine weather continued to prevail but decreased during extended periods of cloudy or rainy weather. Deaths from bronchitis and bronchial asthma over fine days of clear weather were more than twice as high as on rainy days while deaths from influenza were seven times as high. The analysis of the variations of temperature in terms of weather indicated that the temperature range/day and the amplitude of temperature are greatest on fine days and that on fine days, the temperature is lowest in the hours (1-6 am) when the physiological faculty of man is lowest. These factors explain the high rates on death fine days.

10898 APTIC NO. 28365

Graef, W.

DANGER THROUGH CARCINOGENIC SUBSTANCES IN THE ENVIRONMENT.

(Gefaehrdung durch kanzerogene Substanzen in der Umwelt). Text in German. Oeffentl. Gesundheitswesen (Stuttgart), 33(3): 121-132, March 1971.

Air pollution in the form of smoke, soot, automobile exhausts, and pavement and tire abrasions may cause cancer of the respiratory tract through carcinogenic substances in large cities, benzo(3-4pyrene concentrations up to 6.8 micrograms/100 cu m air have been measured, while in rural areas concentration range from about 0.1 to 0.4 micrograms/100 cu m air. It is estimated that the city resident inhales about 10 mg of benzo(3-4)pyrene in the course of his life. The presence of benzo(3-4)pyrene in plants is due less to air pollution than to natural plant synthesis. The natural level of polycyclic aromatic hydrocarbons in the environment referred to benzo(3-4)pyrene is about 1 to 2 micrograms/100 g dry plant substance. Comparative studies on human and pig organs revealed that benzo(3-4)pyrene and its homologues are regularly present in concentrations which are far below those of plants. Man has a benzo(3-4)pyrene level two and one-half times higher than that of the pig.

10899 APTIC NO. 28381

Policard, A., M. Letort, J. Charbonnier, H. Daniel-Moussard, J. C. Martin, and L. Le Bouffant

EXPERIMENTAL STUDIES CONCERNING THE SUPPRESSION OF THE CYTOTOXIC EFFECT OF QUARTZ BY MINERAL SUBSTANCES, PRIMARILY BY ALUMINUM COMPOUNDS.

(Recherches experimentales concernant l'inhibition de l'action cytotoxique du quartz au moyen de substances minerales, notamment de composes de l'aluminium). Text in French. Beitr. Silikose Forsch. (Bochum), 23(1):1-58, 1971. 36 refs.

Calcite and diatomite dusts were administered to rats through aerosol inhalation of tracheal and peritoneal injections to determine if the dusts inhibited the cytotoxic effects of quartz dusts, which were administerd in a similar manner. Calcite afforded only temporary protection. In contrast, diatomite almost completely suppressed silicotic lesions. Protection by diatomite was due not to the the silica but to mineral impurities present in this compound. Since the mineralogical nature of the impurities could not be accurately determined, the action of other oxides (e.g., aluminum oxide, iron oxide, and magnesium oxide) present in small amounts in diatomite was tested. Only aluminum hydroxide was able to inhibit the effects of quartz; it was effective at 1.5 to 2% of the amount of quartz injected. Inhalation of aluminum dust, however, has the disadvantage of increasing the dust load in the lung. This can be avoided if solutions or colloidal suspensions of aluminum compounds are used. Brief inhalation of aluminum chlorhydroxyallantoinate aerosol and a colloidal suspension of aluminum hydroxide in aerosol form provided lasting protection to rats exposed to quartz dust for two months. In a 12-month evaluation period, no silicotic lesions were observed. These aluminum compounds operate by modifying the surface layer of quartz particles. The solubility of the quartz is greatly reduced and its crystalline surface lattice disappears.

10900 APTIC NO. 28382

Reichel, Gerhard

PNEUMOCONIOSIS.

(Pneumokoniosen). Text in German. Med. Klin. (Munich), 66(9):297-302, March 1971. 42 refs.

Pneumoconiosis develops after inhalation of organic and inorganic dusts, which are deposited in the nose and thorax, the alveoli, or the bronchial system. Particles with a diameter of more than 30 micron remain in the nose and thorax, while particles between 1 to 5 micron reach the alveoli and the lung parenchyma. All other particles in the bronchial system. The pathogenic effect of the dusts is based on reactions of the bronchial mucous tissue, dust retention in lung tissue, and changes of parenchyma in the form of fibrosis. Among organic dusts causing lung damage are cotton dust (byssinosis), sugar cane dust (bagassosis), corn and hay dust, manure and soil dust, dusts from mushrooms and peppers and allergenic dusts such as pollen, flower, tropic wood, and feathers. The inorganic dusts causing lung damage include asbestos, iron, tin oxide, Thomas slag, manganese, aluminum, beryllium, cadmium, chromium, and arsenic. Of these dusts, asbestos, arsenic and chromates are carcinogens. Quartz dusts have no direct carcinogenic effect.

10901 APTIC NO. 28383

Melichar, F.

DISEASES DUE TO CIVILIZATION IN THE TROPICS.

(Zivilisationskrankheiten in den Tropen). Text in German. Med. Welt, 22(11):431-433, March 1971. 25 refs.

The frequency of occurrence of atherosclerosis and diabetes in industrialized countries between 1958 and 1962 was compared with that in the area of Haiphong, North Vietnam. Diabetes occurred in 0.025% of the population of Haiphong and in from 0.2% to 2% of the population in Europe and America. Among the 18,000 patients treated in a Haiphong clinic, no myocardial infarctions were observed. The occurrence of these diseases in western societies is to some extent to industrialization, which is not yet advanced in the Haiphong area.

10902 APTIC NO. 28411

Grannis, George F.

DEMOGRAPHIC PERTURBATIONS SECONDARY TO CIGARETTE SMOKING.

J. Gerontol., 25(1):55-63, 1970. 33 refs.

As the difference in the average longevity of male cigarette smokers and nonsmokers, found in epidemiologic studies, has been large enough to have marked demographic effects, the demographic parameters most sensitive to a premature increase in the age-specific mortality rates of males were analyzed. The results show that the ratio of elderly females to males and the ratio of widows to widowers have changed during the past 75 years to the extent expected on the basis of national cigarette consumption by males and the known relation of the degree of cigarette smoking to premature mortality of males. By 1965 these changes had resulted in a deficit of 1.75 million widowers and an excess of 2.50 million widows. No other factors which would have caused changes of this kind and magnitude are apparent. (Author summary)

10903 APTIC NO. 28422

Shalamberidze, O. P.

CONCURRENT EFFECTS OF LOW SO2 AND NO2 CONCENTRATIONS IN LONG-TERM EXPERIMENT.

(Sovmestnoe destvie malykh kontsentratsii sernistogo gaza i dvuokisi azota v usloviyakh khronicheskogo eksperimeta). Hyg. Sanit., vol. 34:11-15, April 1969. 8 refs.

The effects of microconcentrations of sulfur dioxide and nitrogen dioxide were studied in healthy albino rats and in albino rats with chronic pulmonary insufficiency. Animals from each category were divided into groups of 10 and exposed for three months as follows: 1st group, 0.15 microgram/cu m SO2; 2nd group, 0.1 microgram/cu m NO2; 3rd group, 0.078 microgram/cu m SO2 plus 0.052 microgram/cu m NO2; 4th group, 0.15 microgram/cu m SO2 plus 0.1 microgram/cu m NO2; 5th group, 0.74 microgram/cu m SO2 plus 0.49 mg/cu m NO2. The animals were studied for changes in chronaxial ratio, blood cholinesterase activity, changes in urinary secretion coproporphyrins, changes in SH groups, and blood catalase activity. Only the fourth and fifth groups were found to be affected by the long-term exposure to SO2 or NO3. The effects were more pronounced in the animals with chronic pulmonary insufficiency. The functional changes observed in the fourth and fifth groups were paralleled by morphological changes in their internal organs.

10904 APTIC NO. 28425

Lowry, Thomas and Leonard M. Schuman

SILO-FILLER'S DISEASE: A NEWLY RECOGNIZED SYNDROME CAUSED BY NITROGEN DIOXIDE INHALATION WITH A REPORT OF SIX CASES.

Univ. Minn. Med. Bull., vol. 27:234-238, May 1, 1956.

Inhalation of nitrogen dioxide which accumulates in freshly filled silos may produce highly lethal bronchiolitis obliterans. Nitrogen oxides from silage are derived almost entirely from inorganic nitrates in the plant, and, therefore, levels are roughly proportional to nitrate concentration in the silage. Factors known to increase plant nitrates are drought, nitrate-fertilized soil, and immaturity of the plant itself. The clinical characteristics of Silo-Filler's Disease, noted in five or six cases observed, are mentioned. By x-ray, all lung tissues appear infiltrated with countless discrete miliary nodular densities which become confluent in advanced stages of the disease. Roentgen and other features of the disease may mimic certain infections, especially miliary tuberculosis and histoplasmosis. A moderate to marked neutrophilic leukocytosis is characteristic of the disease. Patients developing Silo-Filler's Disease might benefit from adrenocortical hormones started soon after the diagnosis is confirmed.

10905 APTIC NO. 28429

Stokinger, Herbert E.

AIR POLLUTION AND THE PARTICLE SIZE-TOXICITY PROBLEM--1.

Nucleonics, 5(6):50-62, Dec. 1949. 15 refs.

Industrial air pollution problems are discussed in the context of community air pollution and in-plant pollution. Special attention is given to airborne beryllium concentrations producing clinical disease within a 1/4 mi radius of a beryllium plant, to recent developments in identifying toxic agents in plants, and to particle characteristics responsible for toxic hazards. Cases of beryllium poisoning, some fatal, were caused by environmental beryllium concentrations as low as 0.1-0.01 microgram/cu m air. The toxicity of various grades of beryllium oxides increases with increased surface area, which is associated with increased solubility but not necessarily with particle size. Industrial beryllium poisoning is enhanced by hydrogen fluoride and physical exercise though, unlike silicosis, not by tuberculosis. Two major sites of possible radiation injury from long-term inhalation of uranium dust in very low concentrations are the lungs, from accumulation of insoluble uranium compounds, and bones, chiefly through accumulation of soluble uranium compounds. Lung retention of the insoluble dusts is greatly influenced by particle size.

10906 APTIC NO. 28433

Ellis, F. P.

THE HAZARDS OF TOXIC GASES IN WARSHIPS EXCLUDING AGENTS OF CHEMICAL WARFARE.

J. Roy. Naval Med. Service, 33(1):25-37, Jan. 1947. 29 refs.

The hazards of nitrous fumes, carbon monoxide, petrol vapor, methyl bromide, methyl chloride, and carbon tetrachloride in warships are discussed. Incidents of nitrous fume poisoning are reported in which a latent period of almost complete freedom from symptoms varied in length from 30 min to 24 hr. The fumes were not recognized at the time of exposure and rescue and repair parties later became victims. Prevention lies in remembering that when cordite in a torpedo, mine, bomb, or shell is either detonated or burnt in turrets or magazine fires this hazard will probably exist. The use of gas masks at the earliest possible time will give ample protection for the time required to escape. Carbon monoxide is also a hazard of explosives. Illustrative incidents of carbon monoxide poisoning in coastal craft are described. Accidents of carbon monoxide poisoning in submarine may also occur. Incidents of mild intoxication from petrol vapors are frequent in aircraft carriers. High concentrations of vapor are so irritant to the upper respiratory passages that men exposed try to withdraw from a compartment. Methyl bromide used in fire extinguishers is also known to cause poisoning. Methyl chloride used as a refrigerant ca cause symptoms such as progressive drowsiness, apathy, nausea, vomiting, abdominal pains, coma, convulsions and death. The incidence of carbon tetrachloride poisoning is low although the compound is widely used; unlike the other poisons discussed, it possesses a characteristic ethereal, chloroform-like odor.

10907 APTIC NO. 28434

Schultz-Brauns, O.

LETHAL POISONING BY GASEOUS NITROGEN OXIDES DURING WORK WITH NITRIC ACID.

(Die toedlichen Vergiftungen durch gasfoermige Stickoxyde (Nitrose-Gase) beim Arbeiten mit Salpetersaeure). Text in German. Arch. Path. Anat. (Berlin), vol. 277:174-220, 1930. 74 refs.

Poisonous nitrogen oxides form when nitric acid is reduced by interacting with copper or brass or whenever nitric acid is used as an oxidant. Approximately 150 cases of lethal poisoning by nitrogen oxides are known. Of these, about 56% of the patients died within 24 hours, 27% died 24 to 48 hours after inhalation, 10% died 48 to 72 hours after inhalation, and about 7% later than 72 hours after inhalation. In a number of these cases poisoning was induced by a mixture of carbon monoxide and nitrogen oxides. The true number of lethal poisonings with nitrogen oxides by far exceeds the recorded cases. In all cases the gases were inhaled only for a period of a few minutes or even seconds. No symptoms were noted for 5 to 10 hours following inhalation until suddenly respiratory and circulatory insufficiency set in followed by severe symptoms of pulmonary edema and death. Results of post mortem examinations of 36 cases and of toxicological animal experiments with nitrogen oxides are reviewed. Methemoglobin formation appears to be a toxic manifestation but in many lethal cases no methemoglobin was detected. It is not known why only some persons die following inhalation of nitrogen oxides.

10908 APTIC NO. 28439

George, Marilyn E., James P. F. Murphy, and Kenneth C. Back

EFFECTS OF CARBON MONOXIDE ON BRAIN CELLULAR METABOLISM IN MONKEYS. (FINAL REPORT).

Aerospace Medical Research Lab., Wright- Patterson AFB, Ohio, AMRL-TR-70-88, Proj. 7163, 25p., Aug. 1970. 20 refs.

NTIS, DDC: AD 713609

Three groups of six monkeys each were exposed (for 5 or 14 days) to atmospheres of 9220 mg/cu m and 440 mg/cu m carbon monoxide in 68% oxygen, 32% nitrogen at 5 psia. The effects of these atmospheres on mitochondrial respiration and energy production and blood gas levels were studied. The amount of carboxyhemoglobin formed at the 220 and 440 mg/cu m exposure levels was 20 and 30% respectively. Neither level produced a degree of hypoxia sufficien to cause any significant changes in mitochondrial respiratory control or energy production. There was a significant decrease in blood oxygen content, oxygen saturation, and pO2 in monkeys exposed to 440 mg/cu m CO. Results of necropsies showed no pathological changes due to exposure on any of the organs examined.

10909 APTIC NO. 28452

Khachatryan, M. K.

ACCUMULATION OF LEAD IN TEST ANIMALS IN CONNECTION WITH AIR POLLUTION.

(Nakopleniye svintsa v organizme podopytnykh zhivotnykh v svyazi s zagryazneniyem atmosfernogo vozdukha). Text in Russian. Gigiena i Sanit., no. 1:12-16, 1955. 7 refs.

Eighteen rabbits exposed for 3 months to polluted air in the vicinity of a nonferrous metallurgy installation were examined. Spectral analysis of bone, liver and muscle tissue revealed increased levels of lead in exposed animals. Eating food grown in the polluted area was demonstrated as a secondary route of heavy metal intake.

10910 APTIC NO. 28458

Mnatsakanyan, A. V.

EFFECT OF TRACE AMOUNTS OF CHLOROPRENE IN THE ATMOSPHERE ON ADRENAL FUNCTION IN CHILDREN.

(Vliyaniye mikrokontsentratsiy khloroprena v atmosfernom vozdykhe na funktsiyu nadpochechnikov u detey). Text in Russian. Gigiena i Sanit., 31(1):98-100, Jan. 1966. 7 refs.

Studies made of 97 children at schools where atmospheric chloroprene levels ranged from 0.26 to 0.49 mg/cu m demonstrated participation of the adrenals in adaptive responses of the organism to this pollutant. This, together with previous findings indicating changes in porphyrin metabolism among children from these same schools, is used as the basis for recommending 0.08 mg/cu m as the maximum allowable concentration for chloroprene in the atmosphere.

10911 APTIC NO. 28460

Buechley, Robert W.

EPIDEMIOLOGICAL CONSEQUENCES OF AN ARSENIC-LUNG CANCER THEORY.

Am. J. Public Health, 53(8):1229-1232, Aug. 1963. 13 refs. (Presented at the American Public Health Association, Annual Meeting, 90th, Miami Beach, Fla., Oct. 17, 1962.)

The world-wide lung cancer epidemic associated with cigarette smoking is explained by an epidemiological chain showing excess lung cancer at each step leading from arsenic-high mines and smelters, through arsenical insecticides, to lead arsenate spray residues on cigarette tobaccos. The advantages of this theory lie in its accounting for scattered observations of excess lung cancer not associated with smoking in such a way as to explain the cigarette-lung cancer link, and in its suggesting a variety of studies to determine the existence and amount of lung cancer excess in populations with specifiable exposure to arsenic. These populations include miners, smelterworkers, dwellers near smelters, insecticide factory workers, and insecticide-spraying agriculturists. According to this theory, lung cancer rates in the U. S. should begin to decline about 1970 due to the cessation of arsenic spraying about 1950.

10912 APTIC NO. 28461

Shepard, Thomas H. and B. Raymond Fink

TERATOGENIC ACTIVITY OF NITROUS OXIDE IN RATS.

Toxicity Anesthetics Proc. Symp., Seattle, Wash., 1967, p. 308-323. 13 refs. (May 12-13.)

To study the toxic effects of nitrous oxide on mammalian fetuses, pregnant rats were exposed to a gas mixture of 45-50% N2O for 2-6 days. The commonest disturbances produced when treatment commenced on day 8 of embryonic development were death and resorption of embryos and abnormalities of the vertebrae and ribs. The percentage of survivors and average fetal weight decreased with duration of exposure to N2O. Other types of skeletal abnormalities several major visceral malformations, and some alteration in sex ratios were also found. To find the time of embryonic development most sensitive to N2O exposure, rats were also exposed for 24-hr periods on day 5 through day 11, using a 70% N2O mixture. Results indicate that a peak incidence of malformation occurred after exposure on day 9. The axial skeletal abnormalities were similar but of less marked degree than those in animals treated for more than one day. Possible causes of these findings are discussed; their relevance to human pregnancy is not known.

10913 APTIC NO. 28468

Zykova, A. S.

CONTAMINATION OF ATMOSPHERIC AIR WITH LEAD AND ITS EFFECT ON POPULATION HEALTH.

(Zagryazneniye atmosfernogo vozdukha svintsom i vliyaniye ego na zdorov'ye naseleniya). Text in Russian. Gigiena i Sanit., no. 2:12-17, 1957. 9 refs.

Studies of air pollution in the vicinity of storage battery and tin-smelting plants showed gross lead emission levels of about 5.7 and 14.7 kg/day, respectively. Average daily lead concentration 500-700 m from the battery plant exceeded the maximum allowable concentration (0.0007 mg/cu m) by 3 to 4-fold, and 1500 m from the tin-smelting plant there was a 5- to 6-fold excess. Lead levels inside living quarters and public buildings were 3 to 5-fold higher than the maximum allowable concentration. Clinical studies revealed that residents of these areas suffered functional disturbances of the nervous system, and diseases of the gastrointestinal tract and cardiovascular system. High urine lead content was also detected in some cases. Examination of cat tissue supported the hypothesis that lead accumulation in the organism takes place under these conditions.

10914 APTIC NO. 28478

Wentzel, K. F.

DOES FOREST AIR REALLY CAUSE DISEASE? (Macht Waldluft wirklich krank). Text in German. Holz-Zentralblatt (Stuttgart), 7(43): 653-654, April 10, 1970. 5 refs.

Statements by some American scientists to the effect that forests emit terpenes causing blue haze and increasing the incidence of asthma are analyzed. The amount of organic volatile substances emitted annually into the atmosphere by vegetation is estimated to be roughly a billion tons. Thus, ripening fruit emits ethylene and certain plants emit alkaloids, but most important is the emission of terpenes which, as constituents of essential oils, are emitted primarily by herbs and conifers whose needles contain 0.8 to 1% terpenes. It is true that, quantitatively, vegetation contributes more to overall atmospheric pollution than does human activity but the question of its noxious effect on human health is doubtful. It is true that terpenes and esters emitted by conifers under conditions of high atmospheric radiation prevailing in the Nevada desert can be oxidized to blue haze which is a parallel to the oxidation of unsaturated hydrocarbons from automobile exhausts to smog-like substances. It is also true that asthma under such conditions will be aggravated but it is not true that terpenes can be emitted by forests in a concentration that would be harmful to human health. The boiling point of most terpenes is between 150 and 170 C; thus they can be volatilized in greater amounts only at temperatures which do not occur in forests. Comparison with smog conditions in Los Angeles is not indicated.

10915 APTIC NO. 28493

Tikhonov, G. P., G. M. Gorban', and Yu. B. Bizin

COMPARATIVE EXPERIMENTAL STUDY OF THE CONTINUOUS AND INTERMITTENT EFFECT OF CARBON TETRACHLORIDE ON THE MICROSTRUCTURE OF ANIMAL ORGANS.

Space Biol. Med. (English translation from Russian of: Kosmich. Biol. Med.), 4(4):27-33, 1970. 3 refs.

NTIS: JPRS 51641

The pattern and level of pathomorphological and histochemical processes that developed in the liver of white male rats exposed continuously (24 hr/day) and intermittently (six hr/day) to 0.5 mg/l carbon tetrachloride were proportional to total exposure time. Structural and metabolic disturbances developed in the liver three to four times sooner during a continuous exposure than during an intermittent exposure of the same total duration. (Author abstract modified)

10916 APTIC NO. 28496

Fridlyand, I. G.

THE EFFECT OF INDUSTRIAL POISONS ON THE IMMUNO-BIOLOGICAL STATE OF THE ORGANISM.

Gigiena i Sanit., 24(8):55-61, 1959. 28 refs. Translated from Russian, p. 149-157.

Immuno-biological reactivity of the organism is controlled by general physiological principles, and the state of the nervous system is a factor of considerable importance in general immunogenesis and in specific immunity manifestation. It is possible for the lowered immulogic reactivity of the organism resulting from some industrial poisonings. It is known that an anti-infection immunity can be hereditary, and individually acquired means of adaptation which resists the entrance into the organ of microbes and viruses, their proliferation, and the deleterious effects of their products of elimination. Such means of adaptation or barriers are presented by the skin and mucosa, inflammation, phagocytosis, the reticulo-endothelial system, the lymphatic tissue barrier functions, humoral factors, and the organism's cell reactivity. It is believed that each of the barriers can be disturbed by the effects of given poisons. Results of experiments and clinical observations found in literature present evidence of the relation existing between the effects of some industrial poisons and the fall in the bactericidal potency of blood serum. It is emphasized that in the sum total of the barriers' action as a phase of antibacterial immunity, they manifest a variety of mechanisms, one of which may be synergistic. Of particular interest are antibodies which change the microbes in the direction of involution, lowered virulence, and susceptibility to phagocytosis. Under present day conditions intoxication with low doses or low concentrations of the toxic agent are encountered most frequently.

10917 APTIC NO. 28506

Inst. of Public Health, Tokyo, Dept. of Industrial Health

REPORT ON THE EPIDEMIOLOGICAL INVESTIGATION OF THE EFFECT OF AIR POLLUTION ON THE HUMAN BODY IN TOKYO -1969: 'THE INVESTIGATION OF THE RESPIRATORY SYMPTOMS BY THE BMRC METHOD AMONG MUNICIPAL EMPLOYEES IN SANTAMA DISTRICTS'.

(Tokyo-to taikiosen jintai eikyo ekigaku chosa hokokusho. Showa 44nen do. 'Santamachiku ni okeru shishokuin ni tsuiteno BMRC hoho ni yoru kokyukishojo no chosa'). Text in Japanese. 27p., 1970.

In October 1968, a survey was made of 771 municipal employees over 40 years old in five Santama districts enjoying relatively clear air. The return rate of the questionnaires sent to the employees was 83.2%. The rate of incidence of a single respiratory symptom was higher in men than women, and the rate increased with age; this was in keeping with the result of an investigation made in 23 wards in Tokyo. The rate of incidence of three principal multiple symptoms was 4.9% in men, 1.2% in women, and 4.1% in men over 40. All analyses of pulmonary function tests (in terms of amount and rate/sec of vital capacity and maximum velocity of expiration) showed higher values in men, but these tended to decrease with age. Sputum was analyzed for structure and amount. For employees from 40 to 59, the degree of atmospheric contamination is assumed to be related to the occurrence of symptoms. Such a relationship was observed in Tokyo in the care of symptoms of chronic bronchitis.

10918 APTIC NO. 28508

Chiba Prefecture (Japan)

REPORT ON INVESTIGATION OF EFFECTS OF SMOG, ETC.

(Baien to eikyo chosa hokokusho). Text in Japanese. 91p., 1969.

In Ichihara City, Chiba Prefecture, 338 pupils from a primary school in a polluted area and 156 pupils from schools in pollution-free areas were examined by pediatricians on four occasions between June 1969 and February 1970. Special emphasis was put on tracheal diseases. Histological checks on nose secretion and phlegm, and bacteriological tests of phlegm, were made at each examination. Some children were also tested for skin reaction. Only 1.7% of the children at the control schools had pharyngitis in contrast to 6.2% at the polluted school. With few exceptions, the children at the control schools had greater lung facility. Chest X-rays showed abnormal shadows for two pupils at the polluted school; there were none at the control schools. There were also more absences at the polluted school, a greater tendency toward colds among the pupils, and significantly more complaints about sore throats, fever, phlegm, running noses, and coughing. Simultaneous air quality measurements indicated that dust in the area of the control school was about 73% that of the polluted area. Lead dioxide in the control area was about 50% that of the polluted area.

10919 APTIC NO. 28511

Nolte, D.

IRRITATION OF THE BRONCHIAL SYSTEM BY EXOGENOUS TOXICANTS.

(Reizbarkeit des Bronchialsystems gegenueber exogenen Noxen). Text in German. Med. Klin. (Munich), 66(9):319-322, March 1971. 19 refs. (Presented at the Bad Reichenhaller Forschungsanstalt fuer Krankheiten der Atmungsorgane, Kolloquium, 3rd, Bad Reichenhall, West Germany, June 20-21, 1970.)

Changes in the chemical composition or physical properties of air irritate the bronchial system, which responds by constricting the bronchi. That this reaction follows inhalation of sulfur dioxide, sulfuric acid, formaldehyde, or phosgene was previously confirmed by measurements of pulmonary airflow resistance. In the present investigation, 117 persons were exposed to a relatively mild exogenous irritant, cold air, for 10 min. The subjects included both healthy individuals and patients with respiratory disease. Subjects with bronchial asthma responded with a markedly higher increase of airflow resistance than healthy subjects. In patients with chronic obstructive bronchitis, the irritating effect of cold air was only mildly higher. In all groups, the degree of broncho-constrictive effects was spread rather evenly with a wide scattering zone. There was no excessive response to cold air in the group with normal airflow resistance or among subjects with chronic obstructive bronchitis. In neither group was there any case of no response or any case of high response.

10920 APTIC NO. 28516

Sachs, Hans

CANCER EPIDEMIOLOGY IN HAMBURG.

(Krebs-Epidemiologie in Hamburg). Text in German. Umschau (Berlin), 71(4):131, 1971. 2 refs.

The geographic distribution of cases of occurring cancer among men and women in Hamburg between 1960 and 1962 was studied. A total of 15,000 deaths from cancer were examined. Highly significant area differences for all types of cancer, including carcinoma of the collum and corpus uteri, ovaries, stomach, liver, gall bladder, and respiratory tract were found for women. Area differences were also found for all types of cancer in men, particularly for duodenal cancer and carcinoma of the respiratory tract. A positive correlation was found between frequency of cance and density of industries. Construction workers, carpenters, painters, shipyard workers, and office employees were particularly prone to cancer of the respiratory tract.

10921 APTIC NO. 28518

Benko, G., J. Haber, Z. Than, K. Kishindi Kiss, Gy. Varga, and L. Tabar

STUDIES OF LUNG CIRCULATION IN SILICOSIS THROUGH SERIAL ANGIOGRAPHY.

(Die Untersuchung der Lungenzirkulation bei Silikosen durch Segmentangiographie). Text in German. Fortschr. Geb. Roentgenstr. Nuklearmed., 114(2):207-214, Feb. 1971. 19 refs.

Pulmonary capillaries in 28 miners with silicosis were examined by means of serial angiography and ventilation studies. The capillary system of the lungs was damaged in the majority of cases. This damage occurs at all stages of silicosis and does not parallel the degree of severity shown on X-rays. A certain relationship exists between duration of dust exposure and the severity of the capillary damage: the damage is greater for an exposure of 25 yrs than for shorter periods. Capillary damage in silicosis develops in the absence of any obstructive syndrome; it may reach a severe stage in the presence of obstructions even though X-rays indicate a moderate case of silicosis.

10922 APTIC NO. 28520

Walkenhorst, W.

FUNDAMENTALS OF DEPOSITION OF SMALL PARTICLES IN THE BRONCHI AND ALVEOLI.

(Grundlagen der Deposition kleiner Teilchen im Bronchial- und Alveolarraum). Text in German. Med. Klin. (Munich), 66(9):303-307, March 1971. 16 refs. (Presented at the Kolloquium der Bad Reichenhaller Forschungsanstalt fuer Krankheiten der Atmungsorgane, 3rd, Bad Reichenhall, West Germany, June 20-21, 1970.)

The deposition of inhaled particles in terms of quantity as well as localization is primarily a function of their size. Particles larger than 5 to 10 micron in diameter do not penetrate into the alveolar space but are deposited on ciliated epithelium in the bronchial system. With decreasing size, the particle fraction reaching the alveoli increases; however, the total quantity of the deposited material decreases. Maximum alveolar deposition occurs with particles between 1 and 2 micron. Minimum deposition is found at 0.5 micron. Water-soluble particles or droplets swell through condensation of water vapor in the respiratory paths. The nose is a very inefficient organ for precipitation of fine particles. Individual factors cause a wide scattering of the amount deposited, which depends also on respiration rate and breathing-depth.

10923 APTIC NO. 28521

Iravani, J.

THE EFFECT OF AEROSOL INHALATION ON THE CILIATED EPITHELIUM.

(Wirkung von Aerosolinhalationen auf das Flimmerepithel). Text in German. Med. Klin. (Munich), 66(9):315-318, March 1971. 17 refs. (Presented at the Kolloquium der Bad Reichenhaller Forschungsanstalt fuer Krankheiten der Atmungsorgane, 3rd, Bad Reichenhall, West Germany, June 20-21, 1970.)

The speed of mucous transport between the terminal bronchiole and the trachea increases 20 and 40-fold in the rat. The coat of mucous secretions however, deepens in direction of the mucous flow. Because of these properties of the mucociliary mechanism in the tracheobronchial tree, the peripheral respiratory tract is particularly sensitive to inhaled particles. These particles remain on the mucous membrane of a bronchitic area longer than in healthy parts of the respiratory tract. These findings were confirmed by experiments on five female rats with chronic bronchitis and five healthy rats. Both groups were exposed to a coal dust-laden atmosphere (1 g coal dust/cu m). About 19 hrs later, the tracheobronchial tree was examined.

10924 APTIC NO. 28541

Szoelloesi, Erzsebet, Ferenc Medve, and Endre Jeney

THE EFFECT OF LOW CARBON MONOXIDE CONCENTRATIONS IN THE AIR ON HUMANS. PART II: PHYSICAL EXAMINATION OF WORKERS IN CAR REPAIR AND CONSTRUCTION WORKSHOPS.

(Angaben zur Wirkung des niedrigen Kohlenmonoxyd-Gehaltes in der Luft auf Menschen. II. Teil: Untersuchung der Werktaetigen in Autoreparatur- und Montagewerkstaetten). Text in German. Zentr. Arbeitsmed. Arbeitsschutz, 21(3):69-74, March 1971. 25 refs.

The effect of carbon monoxide in ambient air was studied on two groups of auto mechanics: smokers and nonsmokers. The experimental conditions and methods were the same as described in an earlier paper. The average age of the examined workers was 28 years, 68.9% of whom were between 17 and 30 years. Blood pressure in the examined workers was 29% higher than in a control group. The carboxyhemoglobin content in the blood of smokers was on the average 2.38% higher after exposure to CO-containing air. Among nonsmokers, there was a 1.26% increase. In 4.4% of the smokers and 6.4% of the nonsmokers, the number of red blood corpuscles was below 3.5 million. Polycythemia was observed in 16.2% of the smokers and 10.7% of the nonsmokers. Hyperchromia was also very frequent.

10925 APTIC NO. 28542

Capurro, Pietro U.

EFFECTS OF CHRONIC EXPOSURE TO SOLVENTS CAUSED BY AIR POLLUTION.

Clin. Toxicol., 3(2):233-248, June 1970. 31 refs. (Presented at the American Academy of Clinical Toxicology, Annual Meeting, 2nd, Chicago, Ill., Oct. 23, 1969.)

Strong odors, particularly at night, detected in a small valley near Elkton, Maryland, led to an investigation of the compounds in the air. A chemical plant in the valley which distills alcohols and methyl ethyl ketone and processes 'fusel oil' (chief ingredient, isoanyl alcohol) and benzene, recovers solvents from discarded chemical materials. Samples of the water from the creek near the plant were tested by gas chromatography and showed the possible presence of ethyl acetate, amyl alcohol, butyl alcohol, toluene, and trichlorethylene. In samples taken from the lagoons into which the company discards waste products, large amounts of toluene were identified by mass spectrometry. Toluene, methyl ethyl ketone, and ortho-meta-para-xylene were identified by gas chromatography. Analysis mass spectrometry of a black viscous materials taken from the right bank of the creek 50 yards south of the plant showed 33,000 ppm of toluene and 1700 ppm of methyl ethyl ketone. During April 1969, air samples taken at 1 am showed an approximate value of 250 ppm for toluene. Forty-three persons out of 100 exposed to solvent air pollution and living in an area for about two years where pollutants tend to linger were studied. Their most common symptoms were fatigue, burning of the throat, indecisiveness, irritability, absent mindedness, aching feelings, headaches, and lightheadedness. Other symptoms were confusion, pain in the extremities, chest pain, pain underneath the ribs, persistent colds, and burning of the eyes. Soe of the people demonstrated a drunk-like state and faintness. Seven out of eight patients tested with pain underneath the rib cage radiating to the left side and back along the 10th left rib had an elevated lipase during the summer of 1969. Upon removal from the area, the lipase had a tendency to return to normal. Eight out of ten patients tested showed an abnormal glucose tolerance. Seven out of eight patients tested showed an abnormal insulin curve. Pancreatic scanning in three patients was abnormal. Patients showed a tendency to have an elevated fasting blood sugar. Upon removal of the patients from exposure, definite improvement or normalization took place.

10926 APTIC NO. 28545

Ogata, Masana, Ko Hitomi, Fumihiko Jitsunari, and Junko Omori

THE RESPIRATORY FUNCTION AND DISEASES IN THE INHABITANTS OF KOJIMA DISTRICT.

(Kojima-chiku jumin no kokyuki kino, kokyukishikkan ni tsuite). Text in Japanese. In: An Outline of Countermeasures Against Public Nuisance in Kurashiki City. (Kurashiki-shi ni okeru kogai taisaku no gaiyo). Kurashiki Municipal Office (Japan), Chapt. 6(11), p. 136-143, Dec. 1968.

The effect of air pollution on respiratory functions and diseases in the inhabitants of the Honjo, Gonai, and Akasaki areas of Kojima district, Kurashiki city, Okayama prefecture were investigated. The rate of doctors consulted on respiratory diseases was obtained from the number of medical fee payments by National Health Insurance in 1965. The mortality rate for respiratory diseases was taken from death certificates. The subjective symptoms of respiratory disability were investigated at three elementary schools in the district by taking notes on 20 items associated with the eyes and respiratory organs. Also, the peak flow value among school boys was measured with the Wright s peak flow meter. The rate of medical consultation on respiratory complaints by people over years of age (114 persons), showed that women living in the Unotsu and Utoma areas had a higher rate, with 50% at the maximum level (December) and 10% at the minimal level (July), than those who live in other areas. No difference was observed between the mortality rate of people over 60 years old in polluted and non-polluted districts. The subjective symptoms which occurred frequently at two elementary schools in a district contiguous to factories were sore eyes (about 20%) sore throat (about 22%) and'running nose (about 18%). However, there was no difference in the peak flow values between these and the other schools whose students were measured.

10927 APTIC NO. 28549

THE 8TH CONFERENCE OF MEMBERS OF AREA LIAISON COMMITTEE, NATIONAL COUNCIL ON AIR POLLUTION.

(Dai 8 kai chiiki renraku iinkai kiroku). Text in Japanese. Taiki Osen Nyusu (Air Pollution News), no. 62:2-44, Jan. 1971.

Photochemical smog in Tokyo, a regulation concerning special measures on health impairment because of pollution in Osaka, and carbon monoxide were reported on. The photochemical smog in Tokyo on July 18 caused the hospitalization of 45 high school girls as well as complaints such as smarting of the eyes. Unlike Los Angeles smog, nitrogen dioxide did reach a high level to be followed by an oxidant. Since the incident, the Tokyo Metropolitan Government issues a warning when the oxidant concentration reaches 0.15 ppm an hour. However, American data show that plants are damaged at concentrations as low as 0.03 ppm, if this level lasts for 8 hours. The measures taken by the Osaka City Hall included payment of medical expenses and allowances. A total of 768 people qualified for relief, with about 100 actually receiving it. Since CO already exists in human blood, the matter is somewhat complicated. The environmental standard is less than 5 ppm, but when the concentration is on the increase or decrease, thy situation is entirely different. It was pointed out that mental and nervous-system functions are affected when CO in blood reaches a heavy concentration. Although ideally the CO gauges should be placed at a higher level, allowances have to be made. In Tokyo, 70-80% of CO in the air is from exhaust gas from automobiles.

10928 APTIC NO. 28550

Public Health Center, Kishiwada (Japan)

REPORT OF SURVEY ON THE EFFECTS OF POLLUTION LIVING ENVIRONMENT - SURVEY ON THE EFFECTS OF ARTIFICIAL LEATHER FACTORY ON MEN'S HEALTH.

(Seikatsu kankyo osen eikyo chosa hokoku jinzo hikaku seizokojo no kogai ni kansuru jintai eikyo chosa). Text in Japanese. 32p., July 1969.

A company in Kishiwada, Japan which processes polyvinyl chloride was surveyed. Complaints by neighbors of throat irritation, headaches, nausea and hip aches were reported. Although the exhaust gas treatment equipment was improved, the complaints still increased. The Kishiwada Public Health Center was entrusted with the research on the causes and the effects of human health. A preliminary investigation was conducted at the factory to decide on the items to be checked, and a full fledged medical investigation of local citizens was made. Public health center nurses conducted interviews at each household. It was found that the irritating gas was emitted when a paste-like mixed resin, after being rolled, went past the furnace for vesication, with the surface heated to about 200 C. After jet collector treatment, both diethylhexyl phthalate and dibutyl phthalate decreased. However, although matters causing irritation decreased to one-tenth. Most of the people in the area felt as if it had decreased to only one-half. The area was divided into 11 sections and the reaction of the residents was checked. Even after improvement of the gas treatment equipment, residents still complained of headache, nausea vomiting, throat irritation, cough, and a heavy feeling in the head. Although there was no absolute proof that there was any impairment to growth, nutrition of infants, respiratory functions, or effects on pregnant women, it is not clear whether a long exposure to a low concentration gas would have a definite chronic effect. The exhaust gas is now washed, the height of the chimney stack was increased, and the irritating elements in the exhaust gas are now one-tenth of what they were before, but further measures are considered necessary.

10929 APTIC NO. 28556

Adler, P., W. D. Armstrong, Muriel E. Bell, B. R. Bhussry, W. Buettner, H. D. Cremer, V. Demole, Y. Ericson, I. Gedalia, H. C. Hodge, G. N. Jenkins, S. S. Jolly, E. J. Largent, N. C. Leone, T. G. Ludwig, A. E. Martin, G. Minoguchi, J. C. Muhler, E. R. Schlesinger, A. H. Siddiqui, L. Singer, A. Singh, F. A. Smith, G. K. Stookey, D. R. Taves, P. Venkateswarlu, J. C. Weatherell, S. M. Weidmann, and I. Zipkin

FLUORIDES AND HUMAN HEALTH.

(Fluoride und menschliche Gesundheit). Text in German. Oeffentl. Gesundheitswesen (Stuttgart), 33(3):173- 182, 1971. 3 refs.

Fluorides present in atmospheric dust and gases are an important health hazard, since fluoride ions are almost completely retained in the lung. The world consumption of calcium fluoride (for steel production and other purposes) amounts to more than 2 million tons per year. Several times 200,000 tons of CaF2 are produced in the United States alone. Since long-term exposure to high fluorine concentrations is harmful, elimination by the body is of importance. Fluorides are eliminated by the feces, urine, sweat, and in small quqntities by skin. Most of the fluorine is discharged with the urine. A long-term intake of more than 2 to 8 mg/day fluoride causes abnormal density of bones.

10930 APTIC NO. 28557

Ulmer, W. T.

SILICOSIS. PATHOPHYSIOLOGY AND CLINIC.

(Silikose. Pathophysiologie und Klinik). Text in German. Med. Klin. (Munich), 66(9):293-297, March 1971. 33 refs.

Between two and 50 g of dust were extracted from lungs of deceased miners suffering from silicosis. Small quantities of quartz particles with a grain size of 5 micron and less may cause silicosis, while the presence of 1 gram of quartz dust in the lungs is very likely to cause silicosis. The inhaled and retained dust quantity and the concentration of quartz are decisive for the development of silicosis. The cause of respiratory difficulties in silicosis-afflicted persons is due to obstruction of the respiratory path. Since respiratory obstruction is also frequently found among non-silicotic persons, it was necessary to compare the extent of obstructive bronchitis among miners and silicosis patients with that among the population not exposed to quartz dust. Obstructive bronchitis does occur more often among persons in an advanced stage of silicosis; there is a relationship between silicosis and obstruction of the respiratory path.

10931 APTIC NO. 28558

Fujita, Shinnosuke, Motoichi Tanaka, Shoji Kawame, Ichiro Yoshioka, Takashi Furuya, Shogo Shibata, Tatsuo Kosoda, Yokichi Fujiwara, Michiko Makita, Yoichi Ueda, and Hisakichi Tokuda

STUDIES ON CHRONIC BRONCHITIS–EPIDEMIOLOGICAL SURVEY (2ND REPORT).

(Manseikikanshien no kenkyu–ekigakuteki kenkyu (zokuho)). Text in Japanese. Teishin Igaku (Med. J. Communication), 21(3):197-202, March 1969. 2 refs.

In 1967, an epidemiological survey on chronic bronchitis was carried out among 7817 male post-office workers in Tokyo, Tsurumu, and Kawasaki. The results were compared with those of the previous study in 1962. A questionnaire was filled by each employee; the responses were verified or amended by a personal interview with a doctor or trained nurse. Where necessary, an auscultation and percussion were performed. In diagnosing chronic bronchitis, the standards of Fletcher and Fujita (persistent cough and phlegm lasting more than one month and occurring every year for mory than two years) were applied. Of those surveyed, 20.6% and 5.8% had the symptoms of phlegm and coughing, respectively. Chronic bronchitis in accordance with Fujita's standard was recorded for 8.2% of the subjects twice as high as the percentage in 1962. However, with respect to gasping, there was little difference between the two tests. symptoms of chronic bronchitis in accordance with Fletcher's standard were exhibited by about 60% of the subjects, which is in accord with Fujita's standard. The rate of agreement between the two standards increased with increasing age. The incidence of chronic bronchitis was greater among employees working outside or living in center-city and industrial areas. In each of the three cities, levels of gases such as sulfur dioxide, nitric oxide, and nitrogen dioxide had increased since 1962. The observed increase in the incidence of chronic bronchitis is considered to be closely connected with the increased levels of pollution.

10932 APTIC NO. 28559

Chiba Prefecture (Japan), Pollution Countermeasures Section

INVESTIGATION OF EFFECTS OF AIR POLLUTION AND WATER POLLUTION ON MEN.

(Taiki osen oyobi suishitsu odaku no jintai ni ataeru eikyo chosa kenkyu). Text in Japanese. 104p., 1969.

With the cooperation of Chiba University, the Chiba Prefectural Government has been carrying on overall research on the public hygiene aspect of pollution. The studies cover chronic respiratory diseases and malignant lung tumors is citizens of Ichihara City; the photochemical reaction of sulfur dioxide and organic compounds; the photodecomposition reaction of nitrogen oxides in the atmosphere; lesions in respiratory organs caused by air pollutants; statistical studies of the relationship between respiratory diseases and air pollution; basic studies on methods of eliminating small amounts of harmful gases, actual air pollution levels in urban areas; medical survey of children three years old and less in Ichihara City; and epidemiological and clinical studies of bronchial asthma of children in Chiba Prefecture. Children in polluted areas tended to have more frequent colds than those in control area, especially one-yr olds and three-yr olds. The difference was significant. In the control area, children caught fewer colds as they grew older. This was not true of pollution areas. Among primary school children in Ichihara City, 3.3% of the boys and 2.6% of the girls (total, 2.95%) had asthma. In Chiba City, 0.75% of the boys and 0.36% of the girls (total, 0.56%) had asthma in 1964. In 1968 the figures were 1.56% for boys and 0.76% for girls, (total 1.17%).

10933 APTIC NO. 28567

Sugawara, Takashi

EFFECTS OF CO CONCENTRATION IN ATMOPSHERE UPON FACULTY OF DUST EXHAUSTION IN RESPIRATORY TRACT.

(Kido haijin noryoku ni oyobosu CO gasu nodo no eikyo). Text in Japanese. Nagoya Shiritsu Daigaku Igakkai Zasshi (J. Nagoya City Univ. Med. Assoc.), 18(1):23-48, May 1967. 55 refs.

To determine the effect of auto exhaust on the human body, 88 mature male rabbits were exposed to air containing 0.01, 0.05, 0.1, and 0.5% carbon monoxide for 20 min daily for five consecutive weeks. An 8-cm portion of the respiratory tract was removed from each rabbit and charcoal powder less than 80 micron in diameter was fed to the tract. From the distance traveled by the powder during a certain period, the dust expulsion rate was obtained. Exposure to 0.01, 0.05, 0.1, and 0.5% CO decreased the dust expulsion rate during the initial 1, 2, 2, and 3 weeks, respectively. In the case of 0.01 and 0.05 CO, there was a gradual return to the normal rate after 2 and 4 weeks, respectively; there was no recovery following exposure to the higher concentrations. Body weight, blood cell and leukocyte counts, hemoglobin content by spectrophotometer, hemoglobin by Sahli's method, and hematocrit value by capillary method were also monitored. Body weight, blood cell counts, Hb content, and hematocrit value decreased while carboxyhemoglobin and leukocyte counts increased in response to the concentrations used. At 0.1% CO, such changes were not permanent; at 0.5% CO, there was little recovery. The decrease in the dust expulsion rate is concluded to be due to a disturbance in mitochondria in the epidermis cells of cilia by CO, and also to total weakness from anemia. Recovery is considered to be the result of body adaptation to CO.

10934 APTIC NO. 28575

Hasselblad, V., W. C. Nelson, K. E. McClain, R. J. M. Horton, and V. A. Newill

AN OVERVIEW OF EPIDEMIC ASTHMA IN NEW ORLEANS.

Preprint, American Public Health Assoc., New York, 26p., 1970. 13 refs. (Presented at the American Public Health Association Meeting, Houston, Tex., Oct. 20-30, 1970.)

Epidemic asthma in New Orleans was investigated for a decade. Reports first implicated air pollutants from incomplete combustion but later focused on other possible aeroallergens. Daily visits of asthmatic patients to hospitals in seven metropolitan areas were compared, and epidemic peaks at Charity Hospital in New Orleans wer clearly much greater. The high-day visits at the seven hospitals ranged in number from 5 to 76. The Charity Hospital high day had 218 visits. Meteorologic analyses for the fall months confirmed that decreased relative humidity and decreased temperatures were consistently associated with increased visits only during the month of October. Contrary to prior belief, epidemic peaks and heavy rains occasionally occurred together. Orderly geographic progression of epidemic asthma within New Orleans did not generally occur. Epidemic asthma victims made 97% of their total asthma visits on non-epidemic days, and did not differ from other asthmatics in skin test reactivity. No population that had asthma only during the epidemics could be found. Over a 2-year period, there were no consistent associations between increases in asthma visits and roto-slide aeroallergen counts for pollens and spores. (Author abstract modified)

10935 APTIC NO. 28603

Savchenkov, M. F.

DATA ON TOXICOLOGY OF VINYLCYCLOHEXANE AND ETHYLIDENECYCLOHEXANE.

(Materialy po toksikologii viniltsiklgeksana i etilidentsiklogeksana). Text in Russian. Gigieni i Sanit., vol. 30:28-32, July 1965. 4 refs.

Acute and chronic toxicologic experiments were performed on mice, rats, and rabbits. Inhalation, cutaneous, and gastric administration of vinylcyclohexane (VCH) and ethylidenecyclohexane (ECH) was carried out in both healthy and weakened (hypovitaminosis inadequate nutrition) young and mature animals. Inhalation studies showed the vapors of these copolymers to have expressed narcotic an general toxic effects. Chronic studies revealed degenerative lesions of parenchymatous organs, in addition to disturbances of the central nervous and cardiovascular systems. Both substances are readily absorbed through the skin. Maximum allowable concentrations of 0.01 mg/l for VCH, and 0.02 mg/l for ECH are recommended.

10936 APTIC NO. 28610

Miyazaki, Kano

THE AMOUNT OF THE ULTRAVIOLET RAYS IN TOKYO DISTRICT AND ITS ADEQUATE MEASURE RICKETS.

(Tokyo chiho no shigaisenryo to soreni motozuku kurubyo taisaku). Text in Japanese. Shoni Hoken Kenkyu (J. Child Health), 29(2):107, Jan. 1971. (Presented at the Japanese Society of Child Health, Annual Meeting, Kurume, Japan, 17th, Oct. 1970.)

A machine for measuring the energy of ultraviolet contributions was placed on erythema on the roof of Aiiku Institute in Tokyo; in conformity with a day's strength of recorded ultraviolet rays, the total amount of a day's ultraviolet rays from January to December wery calculated as follows: 5.20, 6.06, 10.52, 12.69, 17.93, 11.82, 20.58, 25.79, 16.50, 11.32, 7.04, and 6.21, (measure: E-Viton, time/sq cm). On the other hand, judging from the results of bringing up infants in a room whery a fixed amount of ultraviolet rays was obtained all the time (without letting them sunbathe and without adjunction of Vitamin D, except for those included in the specially manufactured powdered milk), the amount of prophylaxis of rickets in the ultraviolet rays in Tokyo district was 0.1 E-Viton, time/sq cm. From the above results, 15 minutes of nude sunbathing in the following time periods before and after noon from January to December in Tokyo are considered sufficient: 6 hours and 33 minutes (abbreviated as 6:30), 6:56, 7:40, 9:07, 9:54, 9:72, 10:46, 10:34, 4:28, 8:24, 6:56, and 7:03.

10937 APTIC NO. 28611

Yoshida, Ryo, Takeshi Hongu, Kozo Ito, Motoaki Adachi, Genshiro Ide, Yuji Otsu, Yoshimori Ashiwara, and Yasutomo Nakajima

EFFECTS OF NITROGEN DIOXIDE INHALATION ON INFLUENZA VIRUS INFECTION. I.

(NO2 bakuro no infuruenza uirusu kansen ni oyobosu eikyo no tsuite). Text in Japanese. Nippon Eiseigaku Zasshi (Japan. J. Hyg.), 26(1):154, April 1971. (Presented at the Japanese Society for Hygiene, Annual Meeting, 41st, Tokyo Japan, April 1971.)

Histological studies were carried out on mice kept for three months (July 18-Oct. 20) in an open exposure chamber in a yard in Osaka Prefecture. The results were compared with those obtained for mice kept in purified air. With respect to the degree of pollution in the open air, sulfur dioxide averaged 0.04 0.07 ppm/m and dust was 140 150 micrograms/cu m. Only traces of SO2 and nitrogen dioxide were present in the purified air. No dust cells were found in the control group and slight traces of bronchitis were observed in only a few cases. However, slight bronchitis was observed in lungs of the mice exposed to open air. In addition, the deposition of dust and the presence of dust cells were observed to a high degree.

10938 APTIC NO. 28661

Hueper, W. C.

ENVIRONMENTAL FACTORS IN THE PRODUCTION OF HUMAN CANCER.

In: Cancer (London). Vol. 1, London, Butterworth and Co. Ltd., Chapt. 11, p. 404-496, 1957(?). 625 refs.

Environmental carcinogenic factors in the U.S. and foreign countries are discussed, including occupational cancers, habit, custom, dietary and infection cancers, potential environmental human carcinogens, specific respiratory cancer hazards, general environmental relations, industry-related environmental cancer hazards, and sex distribution of cancers. The universal action of environmental carcinogens and the epidemiological pattern of environmental cancers are discussed. Environmental carcinogens are classified and special aspects, such as distribution by age, sex, and race are noted. Causal mechanisms are explained. Inorganic chemicals with carcinogenic properties are discussed, and data are tabulated according to arsenic and arsenicals, asbestos, beryllium, chromium, iron, and nickel. Epidemiological data are also given for benzene, aromatic amino compounds and azo compounds, coal tar and its derivative vegetable tars (including cigarette smoke), shale and lignite oils and tars, petroleum oils, and combustion and oxidation products. Aliphatic hydrocarbons such as isopropyl oil and mustard gas, physical agents such as ultraviolet radiation and X-radiation from electron guns and other rays from radioactive substances, and the medical aspects of the cancers which they cause are discussed. It is concluded that large-scale efforts to achieve effective control of cancer hazards created by recognized, suspected, or potential environmental human carcinogens may produce benefits far beyond the immediate occupational areas to which primary preventive and prophylactic measures may be applied.

10939 APTIC NO. 28675

Scheuplein, Robert J.

THE PERMEABILITY OF THE SKIN TO GASES (FIRST ANNUAL REPORT).

Massachusetts General Hospital, Boston, Dept. of Dermatology, Grant DAHC 19-69-G-0018, Proj. 2N061102B71D, 32p., June 1970. 9 refs.

NTIS, DDC: AD 713865

By measuring the sorption and diffusion rates of homologous series of selected gases and vapors, it is hoped to be able to establish the mechanism of gas or vapor phase diffusion through the skin. A specific aim of this work is to measure the effect of hydration on the permeability of gases, which is important because the interior surface of the skin's barrier layer is normally hydrated, and even small amounts of moisture can significantly alter the physical structure of this tissue. Sorption measurements have been made on a series of linear alkanes and alcohols. Diffusion constants corresponding to the initial rate of sorption were computed. Theses were greater for the alkanes tha for the corresponding alcohol (C1 to C10) but were very similar beyond C11. The alkane diffusion constants were inversely proportional to the square root of the molecular weight. Alcohols were many times more soluble than the corresponding alkanes between C1 and C10, and the solubility of the alkanes increased exponentially with an increasing number of methylene groups. The sorption isotherm of pentane (30 C) was obtained, and sorption and desorption curves were measured for representative members of each homologous series. These curves were not superimposable thus showing that the diffusion constants for the vapors actually are functions of concentrations. There is evidence that continued contact with alkane or alcohol vapors increases the effective surface area of the stratum corneum. Solubilities obtained after long contact with these vapors were three times higher than those measured initially. From the present data there is no evidence that vapor diffusion involves transport through holes in the tissue but the evidence obtained suggests that substances applied as vapors must dissolve into the tissues per se in order to penetrate.

10940 APTIC NO. 28705

Kazasov, P., M. Arghirova, L. Balabaeva, Sp. Mladenova, L. Babajov, T. Todorov, and D. Chardaklieva

AIR POLLUTION IN THE VILLAGE BELOSLAV AND ITS INFLUENCE ON THE HEALTH OF THE POPULATION.

(La pollution de l'air dans le village Beloslav et son influence sur la sante de las population). Text in French. Sante Publique (Bucharest), no. 4:413-424, 1969. 63 refs.

The village of Belslav, Bulgaria is located near sand quarries, and each day 80-120 tons of sand containing 93-94% silicon dioxide are transported through the village. As determined by field studies, the air in Beloslav is highly polluted by finely dispersed dust containing a considerable percentage of SiO2 (14-40%). Microscopic examinations of the population revealed several cases of first-stage pneumoconiosis among persons above the age of 40. An accumulation of silica in the tissues of adults and teen-agers was found; this is considered to be the cause of the impairment of oxygen consumption by red blood cells. Upper airways disease was frequent among inhabitants of the village.

10941 APTIC NO. 28707

Hattori, Shoji, Ryuhei Tateishi, Yasutomo Nakajimi, and Takeo Miura

MORPHOLOGICAL CHANGES IN THE BRONCHIAL ALVEOLAR SYSTEM OF MICE FOLLOWING LOW-LEVEL EXPOSURE TO NO2 AND CO.

(Teinodo NO2, CO gasu renzoku bakuro ni yoru masusu no kikanshi, haikokei no denkenteki keitai henka ni tsuite). Text in Japanese. Nippon Eiseigaku Zasshi (Japan, J. Hyg.), 26(1):156, April 1971. (Presented at the Japanese Society for Hygiene, Annual Meeting, 41st, Tokyo Japan, April 1971.)

Morphological changes in the bronchia and alveoli of male mice were observed by a microscope after exposure of the mice to low concentrations of nitrogen dioxide and carbon monoxide gases, alone or in combination. The concentrations of gases and the duration of exposure in six groups were as follows: group 1. NO2 (0.5 0.8 ppm), 30 days; group 2; NO2 (0.5 - 0.8 ppm) + CO (50 ppm), 30 days; group 3: NO2 (0.2 0.5 ppm) + CO (50 ppm), 45 days; group 4: CO (50 ppm), 30 days; group 5: CO (100 ppm), 30 days; and group 6: a control group, exposure to purified air for 45 days. Specimens for microscopy were produced by the acetic acid uranyl and lead dying method. Edematous swelling and ciliary contraction were observed in the menbraneous substance at the ciliary surface of the ciliary epidermal cell in groups 1.2, and 3 in the bronchi. Edematization was seen partly in the curare-like substances. Edematization of the cytoplasm and the intercellular subtance of the small alveolar epidermis was found among all groups. So-called hyperplastic foci were found among groups 1 and 2.

10942 APTIC NO. 28713

Murayama, Ninzo

THE EFFECTS OF LOW-LEVEL EXPOSURE OF CARBON MONOXIDE UPON THE HEALTH OF TRAFFIC POLICEMEN.

(Teinodo issankatanso bakuro no kotsukeisatsukan no kenko ni oyobosu eikyo). Text in Japanese. Nippon Eiseigaku Zasshi (Japan J. Hyg.), 26(1):145, April 1971. (Presented at the Japanese Society for Hygiene, Annual Meeting, 41st, Tokyo, Japan, April 3-4, 1971.)

Ninety-one policemen (males, average age 29.6 years) in Nagano Prefecture were examined with regard to carboxyhemoglobin levels of carbon monoxide and oxygen in expired air, pulmonary function, and subjective symptoms before, during, and after working hours. In a concurrent environmental investigation, carbon monoxide levels in air and the number of motorcars were studied. Carboxyhemoglobin levels, after work, were higher in outdoor policemen than indoor policemen; especially high levels were recognized in traffic policemen and those working in police boxes, all of whom were exposed on many occasions to CO. The decline in such physical functions as respiration, circulation, and sense of vision was more remarkable in subjects with carboxyhemoglobin levels above 10%.

10943 APTIC NO. 28722

Tsunetoshi, Yoshizo

EPIDEMIOLOGICAL STUDY OF CHRONIC BRONCHITIS WITH SPECIAL REFERENCE TO EFFECT OF AIR POLLUTION.

(Taikiosen to mansei kikanshien). Text in Japanese. Osaka Daigaku Igaku Zasshi (Med. J. Osaka Univ. Japan. Ed.), 20(10-12):367-386, Dec. 1968. 61 refs.

Levels of air pollution in Osaka were investigated according to the British Medical Research Council questionnaire. A total of 34,209 male and female inhabitants over forty years old and living in nine areas of varying air pollution received questionnaires. Respiratory function tests by oral diagnosis, chext X-ray tests, and vitalor were performed. Return rates of the questionnaires were 80.8 92.5%. The incidence of chronic bronchitis in both men and women increased with increasing age and the amount of smoking (the incidence in those who smoked more than 21 cigarettes daily was three or four times as high as for nonsmokers of the same age). A higher rate was shown in an area of high sulfur dioxide concentration. However, there was no correlation between rate of incidence and amount of falling soot. Model expressions to estimate the incidence of chronic bronchitis from age, the amount of smoking and levels of air pollution, and also the incidence of obstructive disorders in those suffering from chronic bronchitis from their age and the amount of smoking were obtained. Estimated values and actually measured values for both incidences were compared. The correlation coefficients were 0.98 and 0.97, respectively. The incidence of obstructive disorders was studied by dividing 2350 subjects who answered the questionnaire into 3 groups: those with chronic bronchitis (group I), those with injuries other than chronic bronchitis (group II), and those who showed no subjective symptoms such as coughing and sputum (group III). Rates decreased in the order of group I, II, and III. In each group, the incidence became higher with an increase in age and the amount of smoking. The results of this investigation were compared with those for Yokkaichi. Qualitative differences in air pollution in both areas have a different influence on the incidence of chronic bronchitis.

10944 APTIC NO. 28723

Takayama, Otohiko, Kyozo Kikuchi, Yoshikatsu Takahashi, Fumio Katano, Mio Endo, Makoto Seto, Yoshiisa Oshio, and Takao Suzuki

FINDINGS OF PHARYNGOLARYNXES OF PUPILS IN PRIMARY AND MIDDLE SCHOOLS IN AN AIR POLLUTED AREA.

(Taikiosenchiku shogakusei, chugakusei no into kyokusho shoken ni tsuite-zokuho). Text in Japanese. Nihon Kikan Shokudoka Gakkai Kaiho (J. Japan Broncho-Esophagological Soc.), 20(3):136-140, June 1969. 7 refs.

The epidemiological effect of polluted air on the upper respiratory tract was studied by comparing results of medical examinations of 292 primary school and 563 middle school pupils in factory districts of Kanagawa Prefecture with those obtained for 83 primary school and 321 middle school pupils in nonpolluted areas. Visual findings gained by medical examination, in otorhinolaryngology were classified into 7 symptoms: pharyngeal posterior wall rubefaction, increase of lymph follicles, blood dilatation, epiglottis cartilage rubefaction, arytenoid rubefaction vocal cord rubefaction, and vocal cord edema. These symptoms occurred at a higher rate in pupils in the polluted area. Pharyngeal posterior wall rubefaction, increase of the lymph follicles, and laryngeal vocal cord edema were found in pupils in primary schools and pharyngeal vasodilatation in pupils in middle schools. Several symptoms appeared to combine with each other, and rubefaction and edema appeared in both acute and chronic form. Therefore, it is considered that no one visual finding has significant implication. In the polluted area, chronic inflammatory symptoms were observed at a higher rate than in nonpolluted areas; in general, a tendency to pharyngitis was found in pupils in primary schools. Laryngitis was observed in pupils in both primary and middle schools at almost the same rates. As a result of comparing similar findings concerning middle school pupil in an air polluted area in Tokyo with those in Kanagawa Prefecture, it was found that much vocal cord edema is seen in Tokyo and much epiglottis rubefaction in Kanagawa. No other significant differences between the two areas were found.

10945 APTIC NO. 28724

Sasaki, Hijiri, Hirotaka Taniguchi, Ekuko Nishisato, Kimiko Kawabe, Akira Ogata, Kazuko Yamamoto, Fumie Onoda, and Yasuo Nakamori

THE RESULT OF THE STUDY ON DISEASES LIKE INFANTILE ASTHMA THROUGH EXAMINATION OF ALL THE KINDERGARTNERS IN TAKATSUKI CITY, OSAKA.

(Osaka fuka Takatsuki-shi zen yochien ni okeru shoni zensokuyo shikkan no jittai chosa seiseki). Text in Japanese. Shoni Hoken Kenkyu (J. Child Health), 29(2):107-108, Jan. 1971. (Presented at the Japan Society of Child Health, Annual Meeting, 17th, Kurume, Japan, Oct. 16-17, 1970.)

In March 1970, investigations on the frequency and distribution of asthma-like diseases, the relationship between such diseases and other allergies, housing and domestic circumstances, and the family medical histories of allergic diseases, including asthma, were carried out on 4432 kindergarten pupils in Takatsuki City. The investigation was initiated by distributing questionnaires to parents, 90.2% of whom responded. Percentages of those who had the anamnesis of asthma-like diseases were as follows: 12.6%, total; males, 15.8%; females, 9.1%. Among those with no histories of diseases like asthma, the same numbers of infants as those having histories of asthma were chosen at random as a comparison group. Some significant differences were recognized between the two groups, both in males and females with respect to nettle rash, allergic rhinitis, allergy to medicines, and susceptibility to colds. Except for a remote school with 20 pupils, a history of asthma was more common among males at all schools. No difference was recognized in terms of dwelling places.

10946 APTIC NO. 28733

Tokyo Metropolitan Public Nuisance Research Inst. (Japan)

REPORT OF SURVEY ON EFFECTS OF AIR POLLUTION ON MEN -- ON THE RELATIONSHIP BETWEEN MORTALITY AND DISEASES WITH AIR POLLUTION -- 1966-1968.

(Taiki osen jintai eikyo chosa hokokusho - Tokyo tokubunai ni okeru shibo to shippei no taiki osentono kanren ni tsuite - Showa 41-43 nendo). Text in Japanese. 112p., March, 1970.

Tokyo is unique in that its population density is the greatest in the world; that 25 years ago, when home-heating was not dependent upon coal, there was no air pollution, and that air-pollution is now on an unprecedent scale. Information was collected from daily death records and a correlation with air pollution indicators (sulfur dioxide and dust) was sought. The Air pollution index in Tokyo equals 9.056 times SO2 concentration (pphm) power 0.631 + 5 times dust concentration (mg/cu m). Among people over 50 there are more deaths in winter than in summer. This seasonal change in mortality rate suggests that temperature is the biggest factor among environmental conditions. Daily mortality rate had only low correlation with factors of air pollution (SO2, dust, air pollution index) and no result suggesting a causal relationship was obtained. There is a positive correlation between mortality rate and high temperature, but it could not be established how much air pollution contributed to winter mortality rates. Further research is necessary on direct cause of death, contributing cause of death, the area where death occurred, and residence. In addition, representative measuring cites should be established throughout Tokyo to determine the relation between SO2 and dust and other pollutants and other meteorological factors.

10947 APTIC NO. 28736

Tanami, Jun-ichiro, Nobuo Sakurai, Toshinori Kobayashi, Masato Momose, and Hiroshi Tanamura

EXPERIMENTAL STUDIES ON THE EFFECTS OF IRRITANT GAS AND DUST ON THE RESPIRATORY ORGANS OF GNOTOBIOTES.

Japan J. Hyg. (Tokyo), 25(3):310-316, Aug. 1970. 13 refs.

Germ-free guinea pigs and conventional guinea pigs were exposed to silca particles, Staphylococcus aureus 209p, and sulfur dioxide. Silica particles invaded the tracheal epithelia and subepithelial tissues in the germ-free animals. In conventional animals, no invasion was observed. Exposure to 40 ppm SO2 for three days followed by exposure to staphylococci resulted in symptoms of bronchopneumonia in germ-free animals. Establishment of bronchopneumonia was closely related to reduced capacity of the respiratory organs. No obvious decrease in clearance capacity was observed among conventional animals under the influence of SO2 or staphylococci, nor did the animals develop symptoms of bronchopneumonia. The results suggest the importance of bacterial association in promoting adaptation of living tissues to foreign substances and also the advisability of using germ-free animals to study the effects of air pollution.

10948 APTIC NO. 28737

Ito, Sukeo, Kiyoshi Ishii, and Hitoo Watanabe

ASTHMATIC DISEASES AMONG SCHOOL-CHILDREN IN KITAKYUSHU CITY - ESPECIALLY RELATING TO AIR POLLUTION.

(Kita-Kyushu-shi gakudo no zensokuyo shikkan, tokuni taiki osen to kanren shite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1): 136, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

Questionnaires related to asthmatic afflications were distributed to primary and junior high school pupils in Kitakyushu. On the basis of their responses, pupils suspected of being asthmatic were screened and eventually given thorough examinations. In the case of primary schools, the frequency of asthma was highest in the Tobata Ward of Kita-Kyushu. The frequencies for primary school and junior high schools in Moji, Kokura, Tobata, Wakamatsu, and Yahata wards are tabulated. In addition, the frequencies of asthmatic cases are plotted on a map.

10949 APTIC NO. 28739

Tomita, Kinuko, Toshio Kawaraya, and Kosuke Haruki

STUDIES OF CHRONIC CO EXPOSURE OBSERVED THROUGH CO CONCENTRATIONS IN EXPIRED ALVEOLAR AIR. PART III. EFFECT OF AUTOMOTIVE EXHAUST UPON THE WORKERS.

(Kokichu COn nodo kara mita CO mansei bakuro no jittai ni kansuru kenkyu. Dai-3-po. Haishutsu gasu osen shokuba kinmuin eno eikyo). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):249, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

The effect of carbon monoxide on persons occupationally and chronically exposed to automobile exhaust gas and on residents along new trunk highways was investigated. The period of investigation was October 1969 and June-July 1970. The subjects included residents along Highway No. 26 in Osaka and officials in charge of collecting tolls at highway entrances. All were nonsmokers. The CO concentration in the expired alveolar air of the subjects was measured. The concentrations with the standard deviation are given for each group of subjects examined. The highest concentrations were found in workers in underground parking lots (average of 33.0 ppm) and toll collectors at highway entrances (average of 21.4 ppm); the lowest concentrations were found in schoolchildren (5.0 ppm) and local residents (average of 6.3 ppm).

10950 APTIC NO. 28750

Watanabe, Hiroshi and Fusa Kaneko

EXCESS DEATH THROUGH THE AIR POLLUTION IN OSAKA CITY. PART III.

(Taiki osendo ni yoru shiboshasu zodai ni tsuite. Dai-3-po). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):127, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

Based on data obtained from November 1962 to October 1967, the relationship between air pollution and the variation in the number of deaths in Osaka Prefecture was investigated. The city of Osaka was designated as the polluted area and suburban Sonoda as the control area. Deaths (not due to external causes) increased when temperature decreased and degree of pollution was high. The deaths also depended on the absolute level as well as the change in the level of pollution. Deaths increased not only when sulfur dioxide concentration was over 0.1 ppm, but also at lower concentrations when the change in concentration was drastic. Similarly, deaths increased when suspended dusts exceeded 0.5 mg/sq m or at lower concentration if change in concentration was rapid.

10951 APTIC NO. 28751

Yoshida, Ryo, K. Motomiya, Motoaki Adachi, Kozo Ito, Seiji Kubo, Shigeru Funabashi, H. Kasuga, Kikuo Hida, and Jube Oeda

STUDIES OF THE EFFECTS OF AIR POLLUTION ON HUMAN HEALTH IN FUJI CITY IN SHIZUOKA PREFECTURE. PART II.

(Shizuoka-ken Fuji chiku ni okeru taiki osen no jintai eikyo). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):128, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

In a survey of the effects of air pollution on residents of Fuji, students at primary schools in a polluted area noted that they were adversely effected by smoke from factories. They complained, for example, of eye irritation, headaches, coughs, sore throat, fatigue, and stomachaches. As determined by pediatric examinations, the frequency of laryngitis was significantly higher in the polluted area, although there was no difference in the frequency of bronchitis. Vitalor measurements of pulmonary functions showed that one-sec, 0.75-sec, and 0.5-sec rates were significantly higher than among control pupils in June. Physical examinations were also conducted on children with bronchial asthma.

10952 APTIC NO. 28752

Nose, Yoshikatsu and Yoshimitsu Nose

AIR POLLUTION AND RESPIRATORY DISEASES. PART IV. RELATIONSHIP BETWEEN PROPERTIES OF AIR POLLUTION AND OBSTRUCTIVE PULMONARY DISEASES IN SEVERAL CITIES IN YAMAGUCHI PREFECTURE.

(Taiki osen to kokyuki shikkan. Dai-4-po. Yamaguchi shotoshi no taiki osen no seijo to heisokusei haishikkan). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):130, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

Residents over 40 years of age in the five cities of Ube, Onoda, Mine, Tokuyama, and Nanyo of Yamaguchi Prefecture were surveyed according to the BMRC method. In the primary survey, for all cities except Mine, a positive correlation was observed between sulfur dioxide concentration (mg/100sq cm PbO2) and the frequency of one type or another of respiratory illness, pulmonary function, and SO2 concentration. Similar results were obtained for settling dusts and chronic bronchitis. In addition a study of smokers and nonsmokers showed that smoking is not unrelated to respiratory diseases. However, in the secondary survey, there was a significant difference for respiratory illness of one kind or another between smokers and nonsmokers, but no significant difference for those having pulmonary damage. For polluted and nonpolluted areas, there was a significant difference between the three types of individuals: those having one type or another of respiratory difficulty, those having pulmonary function damage, and those having chronic bronchitis. It is concluded that the effects of air pollution cannot be satisfactorily described by comparison of polluted and nonpolluted districts alone; at individual differences in smoking habits must be taken into account.

10953 APTIC NO. 28753

Takahashi, H. and Toshiro Nakajima

AIR POLLUTION EFFECTS ON HUMAN HEALTH IN TSURUSAKI DISTRICT OF OITA CITY.

(Oita-shi Tsurusaki chiku ni okeru taiki osen no kenko ni oyobosu eikyo ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):131, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

Residents of the Tsurusaki industrial complex area in Oita City were studied for the relationship between health and air pollution caused by the complex since its establishment in 1964. Based on National Health Insurance records for the residents, statistics were compiled on the common cold, bronchitis, bronchial asthma, pneumonia, laryngitis and pharyngitis, tonsilitis, and emphysema. Tsurusaki industrial area (0.03 ppm SO2, annual average) had a much higher incidence of respiratory illnesses than an unpolluted area 4 km away.

10954 APTIC NO. 28754

Tsuji, Yoshihito and H. Tsunoda

AN EPIDEMIOLOGICAL SURVEY ON THE HUMAN EFFECTS OF FLUORIDE AIR POLLUTION IN KITAKATA, FUKUSHIMA PREF. IN JAPAN.

(Fukkabutsu ni yoru taiki osen no seitai ni oyobosu eikyo ni tsuite no ekigaku chosa. Kitakata-shi no baai). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1): 145, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

An epidemiological study was conducted on the relationship between contamination of air by fluorides emitted from an aluminum refining factory and the health of adults permanently residing in the area. The subjects were residents, aged 35-64 yrs, in the polluted village and of a control village. Subjective symptoms of fluoride poisoning, bone x-rays, cardiac and pulmonary functions, blood characteristics, and fluoride content of urine were studied. 'Discomfort' was obviously more frequent among men and women of the polluted area, but there was little difference between the two villages with respect to irritation of skin and eyes and pain in the joints. Results of pulmonary and cardiac function tests were also similar. Bone x-rays showed that osteosclerosis was relatively more frequent in the polluted area only for knee joints. As far as blood characteristics were concerned, there were no abnormal findings in either village. Urine fluoride levels were higher among men in the polluted area, but the concentrations were ion concentrations and the measurements were made only over a short period. Thus no conclusive statements could be made as to the effects of fluorine on the urine of the residents.

10955 APTIC NO. 28763

Mori, K., Seiichi Nakamura, Tsuyoshi Andoh, and Takeo Miura

COMBINED EFFECTS OF X-IRRADIATION AND NO2 GAS EXPOSURE ON RES. PART II.

(Monaikei saibo ni yoru seitai bogyo. Dai-2-ho. Monaikei kino ni oyobosu NO2 in eikyo). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):147, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

The effect of exposure to nitrogen dioxide gas on biophylaxis on the reticuloendothelial system was studied on artifically weakened laboratory animals. Attention was given to aggregate capacity, speed of foreign body elimination, and the phogocytosis of the phagocytes. There were no effects of NO2 exposure on the aggregate capacity or the speed of foreign body removal, but for a mouse whose resistance had weakened due to X-ray irradiation, functional degeneration due to NO2 exposure could be seen.

10956 APTIC NO. 28764

Watanabe, Hiroshi, Hisako Murayama, Shigeo Yamaoka, Osamu Fukase, and C. Chen

EFFECTS ON RAT OF CHRONIC EXPOSURE OF LOW CONCENTRATION SO2. PART III.

(Biryonodo SO2 mansei bakuro no dobutsu seitai eikyo ni tsuite. Dai-3-po). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):148, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

Young rats and mice were exposed to sulfur dioxide to investigate bronchitic pathohistological changes and changes in the chemohistological enzyme activity. Acute exposure (5 ppm) and chronic exposure (0.5 ppm and 0.1 ppm) were studied. Under acute conditions, the following were observed: decollement of epithelial cells in the mucus of the respiratory tract, increase in the tissues underneath the mucus, extreme blood congestion in the lungs, obstructive bronchitis, hypertrophic increase of lymphocytes around the bronchi, and enlargement of blastoceles. For chronic exposure, bronchitic inflamation was observed. The symptoms were exacerbated with exposure and became almost acute after 30 days. DPN-diapho enzyme activity could be seen in the increased activity in the epithelial cells of the mucus of the respiratory tract and in the tissues underneath the mucus. Further observations were made on the staining by Ac-P and Al-P. In conclusion, an increase in the enzyme activity was observed for SO2 concentration, with DPN-diapho., Ac-P, and Al-P enzyme activities as indices.

10957 APTIC NO. 28765

Yoshida, Katsumi, M. Takatsuka, M. Kitabatake, H. Oshima, and M. Imai

INHALATION EXPERIMENT OF SULFURIC ACID AEROSOL TO GUINEA PIGS.

(Morumotto ni yoru ryusan misto kyunyu jikken). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):149, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

The effects on guinea pigs of a long-term repetitive exposure (46 times over 23 weeks) to sulfuric acid mist were investigated. Sulfur trioxide evolving from heated acid was diluted by moist air and aerosols over 1 micron in size were removed by an impactor with an impinger. The average concentration measured by an electroconductivity method was 8.5 mg SO3/cu m. Albumin was given to some of the animals. Pneumatograms were recorded by means of a kymograph, and changes in the number of acidocytes in 500 leukocytes of blood samples was noted. The pneumatograms showed that for some animals, dyspnea became more severe as the number of exposures increased. For those given albumin, anaphylactic dyspnea was observed. An increase in acidocytes was also observed, although there were individual differences. Blood congestion in lungs as a result of SO3 exposure was also noted.

10958 APTIC NO. 28767

Nose, Yoshikatsu, Kyoko Nose, and Kazuko Yoshisaki

AIR POLLUTION AND RESPIRATORY DISEASES. PART V. RELATIONSHIP BETWEEN AIR POLLUTION AND RESPIRATORY DISEASES AMONG 3-YEAR-OLD CHILDREN AND PRIMARY SCHOOL CHILDREN.

(Taiki osen to kakyuki shikkan. Dai-5-ho). Taiki osen to sansaiji narabi ni jido no kokyukishikkan tono kankei). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):135, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

The correlation between respiratory diseaes, especially the frequency of asthmatic attacks in infants (3-year-olds), children (6-12 yrs), and adults (over 40) and air pollution in the cities of southern Yamaguchi was studied. In the past six years, infant morbidity has increased in Nanyo. There was positive correlation between the frequency of respiratory illnesses and eczema and sulfur trioxide concentration. For Onoda, Ube, Tokuyama, and Nanyo, the frequency of asthma and other respiratory illnesses was high for children in first and second grades and decreased with increase in grades. Bronchitis and asthma were especially high in the urban areas. The frequency of respiratory diseases of children in the 31 districts of the four cities had a statistically significant correlation with air pollution. For the adults, the frequency increased with increasing age.

10959 APTIC NO. 28768

Sugita, K., E. Hino, Masao Shishido, Katsumi Saruta, Mitsuo Watabe, and N. Kukegawa

RELATIONSHIP BETWEEN AIR POLLUTION AND SYMPTOMS OF RESPIRATORY SYSTEM ON CHILD.

(Yoji no kokyukishojo to taiki osen tono kankei. Dai-1-po. Anketo ni yoru kenkochosa). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):134, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

For an epidemiological study of the effect of air pollution on allergic symptoms and dysfunction in children, a preliminary questionnaire concerning children was conducted. Questionnaires were circulated to the guardians of 41,854 kindergarten pupils in Yokohama. The samples were divided into five areas delimited according to the isoquants of sulfur trioxide concentration. The actual response rate was 66.1%, although the general response rate was 81.5%. There was no correlation between SO3 concentration and susceptibility to cold, but clear relationships were seen between SO3 concentration and sore throat, eye irritation, asthma attacks in the past year, and susceptibility to rashes and allergic reactions. Similar results were obtained for SO3 and respiratory illnesses such as infantile asthma. Data according to the degree of pollution, age, and sex are tabulated for various items.

10960 APTIC NO. 28770

Chen, C., Kazuya Okamoto, Hiroshi Naito, Y. Nakajima, and Shigeko Kusumoto

A HISTOPATHOLOGICAL STUDY ON THE LESIONS OF THE GENERAL ORGANS OF THE MICE WITH CONTINUOUS EXPOSURE OF CO IN THE CONCENTRATION OF 50, 100, AND 600 PPM DURING ONE MONTH.

(Co ikkagetsu bakuro mausu no ippanzoki no byorisoshikigakuteki kenkyu). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):150, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

The effects of carbon monoxide on major body organs of mice were investigated. In the 600-ppm group, dilation of capillary blood vessels and anomalies in the vacuoles, especially in the left ventricle, were notable. The 100-ppm group showed similar anomalies but to a lesser extent. Blood congestion in liver was observed in both the 600 and the 100-ppm groups. Congestion in kidneys was proportional to the amount of CO. Degeneration of renal tubes was not clear-cut; in the 600-ppm group, only slight degeneration in the vacuoles of the renal tube epidermis could be observed. It, is concluded, therefore, that exposure of mice to CO leads mainly to blood congestion in organs and subsequent all degeneration, primarily due to lack of oxygen.

10961 APTIC NO. 28775

Yokoyama, Eiji

GAS EXPOSURE AND LUNG ELASTICITY.

(Gasu bakuro to hai danatsu). Text in Japanese. Rinsho Kokyuki Seiri (J. Clin. Respirat. Physiol.), 2(3):177-179, Nov. 1969. 11 refs.

The role of ozone, one of the compounds contributing to photochemical smog, in edema of the lung was investigated Extracted lungs from 12 mongrel dogs killed by exsanquination and lungs of 10 anesthetized dogs were studied. The extracted lungs were separated into lobes and ventilated with air or 5-10 ppm 03 for three hrs with a respiratory pump. The ventilated volume at one time was 26-35% that of inflation of the lung to 40 cm H20 after ventilation. The relation between static pressure and lung volume (P-V) was measured. After these experiments, the P-V relation after injection of saline (20-30 cc/min) excretion of saline, and inflation of the lung to 10 cm H20 was estimated. The anesthetized dogs were killed by exsanquination after ventilation with air or 03 and the same estimations on extracted lungs were made. Extracted lungs showed only a decrease of gas volume after ventilation with air of 10-15 cm H20, but a remarkable decrease in total pressure was found after ventilation with 03. In saline, the P-V relation was almost constant after ventilation both with air and with 03. In anesthetized dogs, edema of the lungs was found after ventilation with 03, which remarkably lowered the compliance of the lung. The P-V relation, however, was the same as for ventilation with air. The contractile force of lobes was constant. In extracted lungs, ventilation with air strengthened the contractile force. In this connection, an experiment was tried with 03 exhaust; 03 reacted on lung phospholipid as a surfactant. It is presumed that edema resulting from ozone can be supplied by new active surfactant even if there is a change of surfactant on the lung surface in the case of the maintenance of lung circulation.

EFFECTS-HUMAN HEALTH

10962 APTIC NO. 28797

Voelkl, Alfred

THE DAILY EXCRETION OF CHROMIUM IN NORMAL PERSONS.

(Tages- Chromausscheidung von Normalpersonen). Text in German. Zbl. Arbeitsmed., 21(4):122, 1971. 5 refs.

Since chromium is widely used as a coating for utensils and as a component in alloys, it was necessary to determine the daily chromium excretion of normal person, i.e., persons not occupationally exposed to high chrmoium concentrations. The 24-hr urine of 16 persons was examined. The chromium concentration was determined by atom absorption in a flame photometer with a Cr hollow cathode lamp at a wavelength of 357.9 nm. The daily chromium discharge fluctuated widely between 4 and 24 micrograms (average 13 plus or minus 6 micrograms). In comparison, a chromium-intoxicated 24-year-old worker discharged 16 mg/24 hours.

EFFECTS-PLANTS AND LIVESTOCK

10963 APTIC NO. 27907

Schmidt, H. J., G. W. Newell, and W. E. Rand

THE CONTROLLED FEEDING OF FLUORINE, AS SODIUM FLUORIDE, TO DAIRY CATTLE.

Am. J. Vet. Res., vol. 15:232-239, April 1954. 27 refs.

Dairy cattle were fed fluorine as sodium fluoride on a daily basis for a three-yr period and periodically examined for the influence of fluorine on lactation, weight, teeth, general health, and bones and tissues. The daily ingestion of fluoride levels as high as 2.5 mg/kg of body weight did not significantly reduce milk production nor cause a depression in weight. There was no evidence in the cows of diarrhea, rough coat, lapping of water, or elongation of the toes which might be attributed to prolonged ingestion of fluorides. The fourth incisors of cows fed 2.0 and 2.5 mg fluorine showed marked mottling, staining, and wear. At the 1.5-mg fluorine level these effects were less apparent. Only slight mottling and staining, with no wear, was evident in cows fed 1 mg fluorine. Third incisors were less effected by fluorine, while first and second incisors remained free of any changes. Slight exostosis developed in three of four cows fed 2.5 mg fluorine but not in cows fed lower levels. The relative intake of sodium fluoride by the animals was consistently reflected in the urinary excretion of fluorine. (Author summary modified)

10964 APTIC NO. 27917

Wolozin, Harold and Emanuel Landau

CROP DAMAGE FROM SULFUR DIOXIDE.

J. Farm Economics, vol. 48:394- 405, 1966. 16 refs.

Various methods are discussed which have been developed for determining the economic losses from crop damage due to sulfur dioxide. Acute injury following relatively high concentrations of pollutant can cause small, highly visible necrotic lesions, but chronic injuries stemming from low levels of pollutants over considerable time spans often result in such effects as discoloration of the leaf, or chlorosis, which becomes noticeable more slowly. Concentration of gas, duration of exposure, and rate of absorption are critical factors determining either injury or damage. An attempt to relate plant damage to air quality levels over a long period is mentioned. This work has been limited to the derivation of two principle elements: exposures in terms of concentration, frequency, and duration; and resistance of the individual plant. An exponential function is derived involving the concentration below which no toxic effects take place, the vegetation lifetime, the 'biological complex factor', fumigation time in hours needed to reach the threshold. A more practicable model might be designed by treating an index of damage such as percentage of leaf destruction as the dependent variable, which could then be equated to some presumably nonlinear function of the relevant factors contributing to the extent of plant damage.

10965 APTIC NO. 27923

Newell, G. W. and H. J. Schmidt

THE EFFECTS OF FEEDING FLUORINE, AS SODIUM FLUORIDE, TO DAIRY CATTLE--A SIX-YEAR STUDY.

Am. J. Vet. Res., 19(71):363-376, April 1958. 21 refs.

A six-year study was carried out to determine the effects of prolonged feeding of fluorine to dariy cows, beginning with two-yr old heifers, under conditions of practical dairy management and practice. Fluorine, as sodium fluoride, at levels as high as 2.5 mg/kg of body weight had no adverse effect on milk production or growth rate. The inseminations per conception, days in gestation, and percentage of live births were uninfluenced by the levels of fluorine used. Regardless of fluorine treatment, birth weights of calves were all within the normal ranges. The degree of dental fluorosis observed depended on the length of time on experiment, the amount of fluorine fed, and age on cow when sodium fluoride was first administered. Although the general health of the herd remained high, frequent unthriftiness and roughened coats were seen in cows fed 2.0 and 2.5 mg fluorine. Exostoses occurred on the metatarsal bones of two cows fed 2.5 mg fluorine and one of these animals subsequently exhibited lameness in walking. These results suggest that the boundary level at which toxicosis may be expected to occur over periods of prolonged ingestion is 2.0-2.5 mg fluorine. The most reliable indicator of the levels of fluorine ingested was found to be fluorine deposition in bone and cartilage.

10966 APTIC NO. 27925

Halbwachs, G.

FOR THE CLARIFICATION OF TAR VAPOR DAMAGE TO PLANTS.

(Zur Aufklarung der Schadigungen von Pflanzen durch Teerdampfe.) Air Pollution Proc. First European Congr. Influence Air Pollution Plants Animals, Wageningen, Netherlands, 1969, p. 167-172. Translated from German. Data Methods Corp., Denver, Colo., 6p., Oct. 12, 1970.

To answer the question which compounds of tar vapors damage plants, and especially potatoes, several of the pure components of tar were tested. Since only vapors evolving between 100 and 300 C cause injuries, the experiments were restricted to acenapthene, acridine, anthracene, carbazole, chrysene, fluoranthene, fluorene, napthalene and phenanthrene. Because evaporation of solvents results in small crystals on the epidermis, these substances were mixed with glycerine forming very small droplets on the surface of the leaves. Injuries occurred only with acridine, anthracene and fluoranthene, but solely when the plants were put in direct sunlight after the fumigation. These three compounds have a very similar chemical constitution in showing a condensed three ring system in one plane. Other acene and anthracene derivatives such as phenazine, xanthene, 2-methyl-anthracene, 9-methylanthracene and 9-10-dihydroanthracene, were also examined. During microscopic observation of the droplets, it was found that droplet changes in regard to a fluorescent reaction resulted under the influence of ultraviolet light. (Author summary)

10967 APTIC NO. 27945

Heaney, Robert J., James R. Fletcher, and Alton W. Huffaker

EVALUATION OF SULFUR DIOXIDE INJURY TO ECONOMIC CROPS.

Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 21p., 1970. 6 refs. (Presented at the Air Pollution Control Association, Annual Meeting 63rd, St. Louis, Mo., June 14-18, 1970, Paper 70-131.)

When the Utah Copper Division of Kennecott Copper Corporation purchased a copper smelter from the American Smelting and Refining Company, it organized the Agricultural and Meteorological Research Department to monitor the atmospheric concentrations of sulfur dioxide and other pollutants, as well as to evaluate any damage to vegetation that could be attributed to the smelter operations. One of the prime responsibilities of the new organization was to maintain good communications with the farmers in the area and continue the policy of crop damage payments that has been established by the American Smelting and Refining Company. Background information is given on the development of the injury payment program and its scientific basis. Evaluation of SO2 injury to vegetation is carried out by using a diagonal sampling pattern across a given field and taking a ten-stem sample at regular intervals to make a total sample which will be representative of th whole field. Ten representative stems are selected from the sample having SO2 injury, and a total leaflet count is made on these ten stems. The estimated percent of leaflet area injured is reported o one hundred leaflets and the average is reported. Total injury is calculated by multiplication of the three reported percentages: the percentage of stems with SO2 injury, leaflets having injury, an the amount of leaflet area injured. These data are applied to the total yield of the crop obtained from available records or estimate taken at the time of harvest. Statistical analysis of the injury data has been utilized to develop a regression equation for calculating economic crop loss as a function of marked stems or the product of marked stems and marked leaflets. Data are also presented on the total annual economic value paid out for crop injury and the effect of emission controls in the reduction of economic loss by crop owners. (Author abstract modified)

10968 APTIC NO. 27988

Thompson, C. R. and Gerrit Kats

ANTIOXIDANTS REDUCE GRAPE YIELD REDUCTIONS FROM PHOTOCHEMICAL SMOG.

Calif. Agr., 24(9):12-13, Sept. 1970.

A field study was undertaken to assess the total effect of photochemical smog on grapes. Twelve plots, each consisting of four Zinfandel grapevines in a vineyeard near Cucamonga, California, were covered with 12 by 12 ft plastic-covered greenhouses. The vines were 8 ft apart, thus allowing one vine in each corner of the greenhouses. Two treatments with six replications were used: one treatment received nonfiltered ambient air supplied at 80 cu m/min, while the other received activated charcoal-filtered air at a comparable rate. The only chemical treatment of the vines during the growing seasons was a dusting with Sevin to control leafhoppers. Fourteen weeks after the experiment started, the vines receiving the filtered air were obviously much greener, whiles the leaves were shown to have much more chlorophyll than those receiving ambient air. When the grapes were picked and weighed, the average weight per berry was about one-fourth greater from vines in filtered air. Sugar content was significantly higher in the grapes grown in carbon-filtered air, but acid content was roughly the same in both treatments. Vines in carbon-filtered air had produced about 25% more growth during the season. However, the most significant result was in the yield of grapes harvested in the second season. While the yield of grapes in 1968 was 13% greater in carbon-filtered air than in ambient air, yield differences in 1969 increased to 258% under the same conditions. This difference from the 1968 values was attributed to the fact that the 1968 flower buds had probably been injured during setting in the fall of 1967 while the 1969 buds had been protected in 1968. In 1969, 103 comparable grapevines were separated randomly into two groups of 50 and 53 vines each. Fifty of the vines received three sprayings each with 1.5 g active, N,N'-diphenyl-p-phenylenediamine formulated in a citrus storage wax emulsion. Where the emlusion collected and dried in heavy deposits, the leaves remained greener than the surrounding leaf tissue. Yield from untreated vines averaged 3.88 kg while the sprayed vines yielded 4.87 kg.

10969 APTIC NO. 28022

Taniyma, Tetsuro and Hiroki Arikado

STUDIES ON THE MECHANISM OF TOXIC GAS INJURY TO CROP PLANTS. VI. EFFECTS OF SULFUR DIOXIDE (SO2) ON THE PHOTOSYNTHESIS OF RAPE AND BARLEY.

(Sakumotsu no gasu shogai ni kansuru kenkyu. VI. Hadaka mugi oyobi natane no kogosei ni oyobosu aryusan gasu no eikyo). Nippon Sakumotsu Gakkai Kigi (Proc. Crop Sci. Soc. Japan), vol. 39:111-116, 1970. 6 refs. Translated from Japanese.

The relation of sulfur dioxide to visible photosynthesis in barley and rape was studied at 10 and 20 C. Exposure of barley to 5, 10, and 20 ppm SO2 for eight hrs/day resulted in rolled up, shrunken leaf points and 10-15% damage to leaf surface. Exposure to 5 ppm SO2 did not cause any visible injury to the leaf surface of rape, but exposure to 10-20 ppm caused 15-20% injury. The damage rate of apparent photosynthesis of both barley and rape was generally higher at 20 than at 10 C. Barley plants registered negative values of photosynthesis under exposure to 5 and 10 ppm SO2, while rape plants registered negative values after exposure to 10 and 20 ppm SO2. This indicates that the apparent destruction of leafy material by SO and the effect of the gas on apparent photosynthesis have different patterns.

10970 APTIC NO. 28031

Rand, W. E. and H. J. Schmidt

THE EFFECT UPON CATTLE OF ARIZONA WATERS OF HIGH FLUORIDE CONTENT.

Am. J. Vet. Res., 8(46):50-61, Jan. 1952. 14 refs.

Observations of cattle that have been continually ingesting and absorbing fluoride from drinking water and from forage provide a direct confirmation of conclusions that have been derived from a study of the literature. Levels of soluble fluoride in the diet can be tolerated as high as 1 mg per kilogram of body weight per day over a long period of time with no ill effect, except possible slight mottling and wear of the teeth. A level of soluble fluoride in the diet of the order of 2 mg per kilogram of body weight per day may result in mottling and severe wear of incisor teeth that form during the period of ingestion, as well as lameness and stiffn emaciation, and general unthriftiness. Conditions as observed in the Phoenix, Ariz., area substantiate conclusions previously drawn from the literature with respect to fluorine content of urine and bones as criteria of damage. The fluorine content of urine must be well above 10 ppm to indicate current consumption of fluorine in damaging amounts, while the fluorine content of the metacarpus must be above 4000 ppm to indicate an accumulated amount that would have any effect other than some slight mottling or wear of the incisor teeth. (Author summary modified)

10971 APTIC NO. 28035

Schmidt, H. J. and W. E. Rand.

A CRITICAL STUDY OF THE LITERATURE ON FLUORIDE TOXICOLOGY WITH RESPECT TO CATTLE DAMAGE.

Am. J. Vet. Res., 8(46):38-49, Jan. 1952. 68 refs.

A critical study of the literature was undertaken to establish the best field method for the diagnosis of fluorosis in cattle, to determine the borderline between amounts of ingested and absorbed fluorine that will be damaging and nondamaging over an extended period, and to establish the best biochemical checks for support of the diagnosis. Since there is usually no reason for examining cows' teeth, the first noticed symptoms of fluorosis in cattle may be bilateral lameness and stiffness, often accompanied by palpable exostoses on the long bones, lower jawbone, and ribs. However, prior to these first-observed symptoms, the incisor teeth will exhibit ineradicable mottling and abnormal wearing, in those cases where the teeth were formed during the period of abnormal fluoride ingestion. In pronounced or advanced cases of fluorosis, cattle may exhibit dryness and stiffness of the hide, poor condition of the coat, diarrhea, impaired appetite, decreased weight gain, lowered milk yield, emaciation, cachexia, and anemia. Bones from animals that have been damaged by fluorosis will analyze more than 3000 to 4000 ppm of fluorine, while no damage from fluorosis has been found unless the urine continuously analyzes well in excess of 10 ppm. Because of the differing ability of various forages to accumulate fluoride, and because of seasonal and other variables, a comprehensive and long term sampling and analytical program is necessary to determine total amounts of fluorides ingested. (Author summary modified)

10972 APTIC NO. 28093

Violet, P.

GENERALITIES ON THE ATMOSPHERIC POLLUTION. DETERMINATION OF THE POLLUTION LEVELS IN THE GREATER LYON AREA.

(Generalites sur la pollution atmospherique. Mesures des niveaux de pollution dans l'agglomeration Lyonnaise). Text in French. Poumon Coeur (Paris), 26(6): 1970.

The composition of pollutants from combustion, from industrial sources and from internal combustion engines is discussed and the clinical, chronic and cancerous manifestations stemming from atmospheric pollution, the effects of atmospheric pollution on plant and animal life and the criteria for the determination of maximal permissible levels of sulfur dioxide, carbon monoxide, of nitrogen oxides, of ozone, of cancerogenic pollutants and of inert dusts are outlined. Results of continuous monitoring of CO, carbon dioxide, SO2 and of dust fall levels by 27 stations located in the industrial complex comprising Lyon, Villeurbanne, Saint-Fons, Feyzin, Venissieux, Saint Priest, Irigny, Pierre Benite and Sainte Foy from 1961 to 1969 are presented in the form of tables and graphs. The median daily level of SO2 emission was 185 microg SO2/cu m air, that of black dust emission was 134 microg/cu m air. The highest level measured at the center of Lyon was 1002 microg SO2/cu m air in January. The median monthly CO2 level was 0.4% in winter and 0.35% in summer. Five percent of all air samples taken at crossroads exhibited a CO level exceeding 40 ppm CO.

10973 APTIC NO. 28105

Yokohama Center for Public Nuisance (Japan) and Yokohama Municipal Univ. (Japan), Dept. of Hygiene

STUDY ON THE EFFECTS OF AUTOMOTIVE EXHAUST GAS: SECOND REPORT ON LEAD COMPOUNDS.

(Jidosha haikigasu no eikyo ni tsuite--Namari kagobutsu ni tsuite dainiho). Text in Japanese. Yokohama Public Nuisance Center Data 26, 24p., Sept. 1970.

Studies were conducted to determine the diffusion of lead contained in automotive exhaust and the accumulation of lead in the body. In the first study, trees growing along a side street with relatively light traffic were examined for their leaf lead content vs. that of the same species on the adjoining heavily travelled main thoroughfare. The results indicated that, in the absence of tall buildings and other obstructions, diffusion of lead reaches 50-70 m As shown by results obtained in May, June, and October, the relationship between exposure time and the accumulation of lead in leaves is quantitatively proportional. In the second study, cats were exposed to exhaust gas containing about 75 ppm carbon monoxide Blood density, hemocyte values, and hemachrome quantity increased in cats exposed to the gas for 30-100 days but decreased in those exposed for 150-202 days. This may be indicative of improved blood quality in the earlier stage of exposure and of subsequent deterioration with continued exposure. There was a marked increase of lead in blood and liver and a less pronounced increase in kidneys, lungs, spleen, and bones. The fact that the quantity of lead in lungs had no direct relationship with that in blood and other internal organs suggests that grain size and the solubility o lead particles are important factors in body lead accumulation.

10974 APTIC NO. 28149

Tamaki, Takahiko, Masaki Uehara, and Yutaka Umeda

STUDIES ON THE EFFECTS OF AIR POLLUTANTS TO THE PLANTS. 1. INVESTIGATION OF THE EFFECTS OF SEA WIND TO PLANT LEAVES AT THE WESTERN PART OF GOSHIKIDAI ON THE SETOUCHI COAST.

(Nosakubutsu ni taisuru kankyoosen no eikyo ni kansuru kenkyu. 1. Setouchi engan Goshikidai seibu chiiki no jittai chosa). Text in Japanese. Kagawa Daigaku Nogakubu Gakujutsu Hokoku (Tech. Bull. Fac. Agr. Kagawa Univ.), 21(48):74-83, March, 1970. 16 refs.

Ten species of plant leaves were collected July through September, 1969, at the western part of Goshikidai in Kagawa Prefecture. PH values of the cell sap obtained from ground plant leaf tissues were determined in situ with a portable pH-meter with specially designed electrodes. The electric conductivity of the water extracts of the same plant leaves was measured with a portable electric conductometer in the laboratory. Wind direction and velocity were monitored at 18 observation stations in the area with Mori's apparatus. The effects on the pH values and specific electric conductivity of the plant leaf cell sap of the wind direction and velocity at each observation station were studied to determine the effects of sea wind. Plant cell sap samples from the observation stations affected by the sea wind showed higher pH values than others. The specific electric conductivity, on the other hand, showed no definite tendency. The duration of water extracting affected the specific electric conductivity to an extreme degree. No marked effects of air pollution on plants were determined except some minor effects of sea wind and fog. When the air pollution due to acidic gases, such as sulfur dioxide and fluorides, is enhanced by sea wind or fog, the effects on plants is expected to be serious.

10975 APTIC NO. 28195

Juhren, Marcella, Wilfred Noble, and F. W. Went

THE STANDARDIZATION OF POA ANNUA AS AN INDICATOR OF SMOG CONCENTRATIONS. I. EFFECTS OF TEMPERATURE, PHOTOPERIOD, AND LIGHT INTENSITY DURING GROWTH OF THE TEST-PLANTS.

Plant Physiol., 32(6): 576-586, 1957. 16 refs.

Poa annua (annual bluegrass) was grown in a greenhouse in various combinations of day and night temperature, photoperiod, and light intensity. At the age of four weeks, the plants were taken out and exposed to smog in standard test boxes. Temperature had a decided effect on plant susceptibility to smog. Plants grown in hot conditions (day 30 C, night 24 C) had a slower growth rate but suffered much less smog damage than plants grown in cool conditions (day 26 C, night 20 C). There was an interaction of light intensit with temperature; plants in high temperatures grew better with high light intensities and plants in cool temperatures grew better with low light intensities. Eight-, 12-, and 16-hr photoperiods produce progressively better growth. Even plants grown in the hot conditions showed fair sensitivity to smog when shaded for an eight-hr photoperiod. Plants grown in hot conditions gained sensitivity when transferred to cool conditions, while those grown in cool conditions lost sensitivity when changed to hot ones. Smog sensitivity was not correlated with the size of plants or growth rate. It was correlated to a high degree with the area over which the stomates were wholly or partly open. It was also correlated with oxidant levels, in data obtained when duration of maximal oxidant readings and climatic conditions were comparable.

10976 APTIC NO. 28222

Froning, G. W., F. B. Mather, J. Daddario, and T. E. Hartung

EFFECT OF AUTOMOBILE EXHAUST FUME INHALATION BY POULTRY IMMEDIATELY PRIOR TO SLAUGHTER ON COLOR OF MEAT.

Poultry Sci., 48(2):485-487, March 1969. 8 refs.

Results are reported for color analyses on white and dark, cooked and uncooked meat from 12 Leghorn roosters and 4 turkey hens exposed to automobile exhaust fumes for about six min. Some marked effects of the fumes on the color of meat are indicated. Gardener aL values are significantly increased in both chicken and turkey meat with the exception of uncooked white chicken meat. Visual scores also indicate significantly more redness in meat from gassed birds. This study demonstrates the possibility that pink color defects in poultry meat may result from exposure to exhaust fumes prior to slaughter.

10977 APTIC NO. 28258

Shupe, James L., Arland E. Olson, and Raghubir P. Sharma

EFFECTS OF FLUORIDES ON FARM ANIMALS.

Preprint, Air Pollution Control Association, Toronto, Ontario Section, and Ontario Dept. of Energy and Resources Management, Toronto, Air Management Branch, 29p., 1970. 31 refs. (Presented at the Impact of Air Pollution on Vegetation Conference, Toronto, Ontario, April 7-9, 1970.)

If animals ingest quantities of fluorides above their safe tolerance level for prolonged periods of time, fluorine toxicosis or fluorosis may result. Acute fluorosis toxicosis usually arises from accidental ingestion of extremely high levels of fluorine compounds in water, vegetation, or other feeds. Chronic toxicosis (fluorosis) is the type of fluorine poisoning most frequently observed in livestock; it is characterized by certain clinical manifestations or pathological lesions. Where fluorosis is suspected, proper sampling and chemical analysis of vegetation may give early indications of the source and extent of the problem. The degree of fluorosis can be determined with a high degree of accuracy by taking into account the amount of fluorine in bone and the tooth classification. Fluorine tolerance limits have been established for various animal species and are summarized in tabular form.

10978 APTIC NO. 28277

Lanphear, F. O.

AIR POLLUTION INJURY TO PLANTS IN ST. LOUIS.

Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 14p., 1970. 7 refs. (Presented at the Air Pollution Control Association, Annual Meeting 63rd, St. Louis, Mo., June 14-18, 1970, Paper 70-133.)

Preliminary observations of plants in the St. Louis area in the fall of 1968 resulted in identification of possible sulfur dioxide injury to sugar maple and probable ozone injury on lilac, black locust, and white pine. Also, Gingko exhibited injury suspected of being due to air pollution in various parts of the city, but most severe in conjunction with heavily traveled expressways. The symptoms on the Gingko were marginal necrosis progressing to necrosis of the entire leaf blade. Laboratory studies with ozone on Gingko demonstrated stippling at 70 pphm, but nothing similar to that observed in the field. Petunias, especially white varieties that are considered sensitive to peroxyacetylnitrate, were observed for possible PAN injury but this was not detected eve though ozone damage to lilacs was detected in the area. Field observations were again conducted in the spring of 1969, and the primary pollution injury was typical of the photochemical pollutant ozone. Except for the evidence of herbicide damage early in the spring most injury appeared in June or July. Phenoxyacetic acid herbicides caused considerable damage over a 1-2 square mile area, with lesser damage more widespread. Chemicals involved in the production of these herbicides were screened and experimentally tested on forsythia. The value of plants as biological parameters was evident.

10979 APTIC NO. 28289

Ruhling, Ake and Germund Tyler

AN ECOLOGICAL APPROACH TO THE LEAD PROBLEM.

Botaniska Notiser, vol. 121:321-342, 1968. 7 refs.

Field and greenhouse measurements of lead accumulation in plants and soil by atomic absorption spectrophotometry are reported. Experiments showed that plants collect airborne lead chiefly with their shoots, and that root uptake is minor. Measurements within 50-100 m from major roads indicated that only a minor part of the lead emitted by vehicles will settle and accumulate in the immediate vicinity of the roads. Mosses were found to accumulate lead to an exceptional extent, and samples of three common types were collected in central and southern Sweden no closer than 300 m to a road to measure regional lead pollution. A distinct NE-SW gradient was found with a decrease towards the NE. The lead concentrations of the mosses increased with precipitation and with decreasing distance to large population centers. In southwest Goetaland, much of the lead washed out by rainfall originates outside Sweden. Analysis of samples collected in Skane from 1860 to 1968 showed that lead concentrations more than doubled in 1875-1900 from their 1860-1875 levels of about 20 ppm. During the first half of the 20th century no measurable changes were observed, but after about 1950 there was a new strong increase to a present average of 80-90 ppm. Very low lead concentrations were measured in samples from northern Scandinavia, indicating that the 'natural' amounts of lead in mosses are very small and that the concentrations measured in this regional and historical study, principally reflect an influence of human activity. (Author abstract modified)

10980 APTIC NO. 28379

Lagerwerff, J. V.

UPTAKE OF CADMIUM, LEAD AND ZINC BY RADISH FROM SOIL AND AIR.

Soil Sci., 111(2):129-133, Feb. 1971. 11 refs.

Soil was sampled at 3 locations at both 7 meters and 200 meters from a heavily travelled road. The extractable metal contents, which were high and low, respectively, were determined by shaking 20 g of air-dry soil with 40 ml N hydrogen chloride for 1 hour, collecting a centrifugate, and analyzing by atomic absorption spectrophotometry. Nine-hudnred gram batches of soil were put in half-gallon cardboard containers lined with polyethylene; radish was sown and the seedlings were thinned to nine plants per container and grown to maturity. Large changes in the soil contents of cadmium, lead, and zinc caused only small changes in the only small changes in the contents of these metals in radish. Increasing the soil pH from 5.9 to 7.2 resulted in decreases in yield and metal contents of the plants. Grown at 200 meters from a busy highway, aerial contamination accounted for more than 40% of the Pb, Cd, and Zn of the radish tops. Only Zn was translocated to the roots to a significant extent. (Author summary modified)

10981 APTIC NO. 28409

Navara, Jan

A CONTRIBUTION CONCERNING EFFECT OF FLUORINE ON SEED GERMINATION IN RELATION TO THE NATURAL CONTENT OF ASH AND SOME BIOGENIC ENDS.

(Prispevok k ucinku fluoru na knicenie semien vo vztahu k prirodzenemu obsahu populovin a niektorych biogennych prvkov). Biologia, 19(8):589-596, 1964. 9 refs. Translated from Russian. Belov and Associates, Denver, Colo., 11p., Jan. 2, 1971.

The effects of low and high concentrations of fluorine on the germination of seeds of peas, barley, white mustard, kohlrabi, and carrots were studied in relationship to the mineral content of the seeds. Fluorine was applied by soaking seeds for 20 hrs in various concentrations of sodium fluoride. High concentrations of fluorine inhibited germination of pea and barley seeds and, to a lesser extent, mustard and kohlrabi seeds. Seeds of poppies and carrots were relatively unaffected. For the most part low concentrations of fluorine had a stimulating effect that was apparent in speed of germination and overall ability to germinate, as well as root growth and the growth of coleoptiles. Increasing the calcium content of seeds by the application of $Ca(NO_3)_2$ decreased the inhibiting effects of fluorine on the germination process. The levels of other mineral elements in seeds appeared to have no correlation with tolerance to fluorine.

10982 APTIC NO. 28427

Pilet, P.-E.

THE EFFECT OF FLUORINE AND OF BETA-INDOLACETIC ACID ON THE RESPIRATION OF ROOT TISSUE.

(Action du fluor et de l'acide beta-indolylacetique sur la respiration des tissus radiculaires). Text in French. Rev. Gen Bot., 71(836): 12-21, 1964. 23 refs.

The effect of various concentrations of BIAA and of fluorine in the form of sodium fluoride on the growth of apical root fragments of Lens culinaris was studied. At all concentrations BIAA inhibited the elongation of the root fragments, fluorine had the same effect at high concentrations but at low concentrations had a stimulatory effect on the growth of the root fragments. BIAA was found to stimulate respiration mildly at low concentrations while it inhibited the absorption of oxygen at higher concentrations. Acting in combination no additive effect was noted. At concentrations stimulating respiration, fluorine was found to reduce the acceleration effect caused by BIAA. Thus fluorine and auxine acted as antagonists in their effect on the respiration of root fragments of Lens culinaris.

10983 APTIC NO. 28437

ten Houten, J. G.

INFLUENCE OF AIR POLLUTION ON PLANTS.

(De invloed van luchverontreiniging op planten). Text in Dutch. Neth. J. Plants Pathol., 73(4):129, 1967.

The history of plant poisoning from gaseous air pollutants in the Netherlands goes back 60 years; the first incident of this kind was damage caused by fluorine in the vicinity of a superphosphate plant. The effects of hydrogen fluoride, sulfur dioxide, and peroxyacetyl nitrate (PAN) are briefly summarized. Hydrogen fluoride, when present in quantities as low as a few parts per billion, can cause damage to the leaves of plants. Lichens are so sensitive to sulfur dioxide that they cannot exist in the vicinity of large cities and industrial centers where the SO_2 concentration is higher than 35 parts per billion. PAN, sometimes known as photochemical smog, was considered an American phenomenon until October 1965, when abnormal weather conditions in western Europe caused serious damage from this pollutant to spinach and lettuce. Damage to the leaves of certain species and varieties of plants makes them valuable as indicators (their sensitivity exceeding that of the human senses), but they are less accurate than chemical analyses, due to the fact that the 'symptoms' are not entirely specific for higher concentrations. The mechanism of plant damage from air pollutants is not completely understood, although it is known for certain that fluorine, ozone, and PAN act at the level of the cells, functioning as inhibitors of the plant enzymes. Fluorine affects the metabolism of carbohydrates; enolase is especially sensitive to this gas. A combination of PAN and ozone strongly inhibits the synthesis of cellulose. Liquid and solid particles in the air can also cause damage directly or indirectly t plants, especially by limiting the incidence of sunlight.

10984 APTIC NO. 28440

Vins, Bohuslav

THE APPLICATION OF ANNUAL RING ANALYSES TO THE DETECTION OF SMOKE DAMAGE. I. A

METHODICAL CONTRIBUTION TO THE TREATMENT OF ANNUAL RING ANALYSES.

(Pouziti letokruhovych analyz k prukazu kourovych skod. Cast I. Metodicky prispevek k zpracovani letokruhovych analyz). Text in Czech. Sbornik Ceskoslovenske Akademie Zemedelskych Ved (Prague), 7(8):753-770, 1961. 14 refs.

Losses in growth gains of silvicultural stands caused by smoke emission can be measured by annual ring analysis. The method is advantageous mainly because the annual gains can be checked far into the past and thus compared with gains before the onset of the pollution. Experience gained in the Krusne Hory area of Czechoslovakia with the methodical processing of 2000 annual ring analyses is reviewed. The principal problem was found in the circumstance that more than half the trees exposed to pollution failed to grow annual rings. At first no rings are added from the ground up to a certain height of the tree; the defect then spreads all the way into the crowns of the affected trees. This observation is of fundamental importance in the calculation of losses in growth gains due to industrial emissions because hitherto the last annual ring next to the bark was always identified with the test year, while in reality a number of annual rings might already have failed to grow due to the effects of emission. Thus errors far exceeding permissible limits might have occurred in the analysis.

10985 APTIC NO. 28442

Levi, Emilio

THE DISTRIBUTION OF CESIUM AND OF STRONTIUM ABSORBED SIMULTANEOUSLY THROUGH THE ROOTS AND LEAVES OF A YOUNG BEAN PLANT (PHASEOLUS VULGARIS VAR. BERNA), AS MANIFESTED BY THE DISTRIBUTION OF TWO OF THEIR RADIOACTIVE ISOTOPES.

(Distribution du cesium ou d strontium, absorbes simultanement par voies racinaire et foliaire, dans une jeune plante de Haricot (Phaseolus vulgaris var. Berna), manifestee par la repartition de deux de leurs isotopes radioactifs). Text in French. C. R. Acad. Sci. Paris, Ser. D, vol. 271:311-313, July 20, 1970. 4 refs.

Sr-85 was applied to leaves of young bean plants which simultaneously received Sr-89 through their roots. Other bean plants received Cs-134 through their leaves and Cs-137 through their roots. Following absorption, the distribution of the four isotopes in the plants was determined from their respective emissions and checked autoradiographically. While the absorption of Sr by a leaf of the plant was not followed by any basipetal movement, that of Cs resulted in its distribution all through the plant. The absorption of both elements through plant roots was followed by a rapid acropetal movement towards the leaves. The specific transports were not influenced by simultaneous absorption through roots and leaves and thus confirmed the independence of the phloem and xylem in young bean plants.

10986 APTIC NO. 28443

Didier, Bertrand

FLUORINE, A DYNAMIC TRACE ELEMENT FOR CORN.

(Le fluor, oligo- element dynamique pour le mais). Text in French. C. R. Acad. Sci. Paris, Ser. D, vol. 269:1767-1769, Nov. 3, 1969. 7 refs.

Corn plants grown in an artificial medium containing 0, 0.5, 1, 2, and 4 mg sodium fluoride yielded after 64 days 19, 30.8, 31.4, 39.6 and 27.3 g dry weight of vegetable matter respectively. A graphic analysis of the growth curve of corn under given experimental conditions yielded 1.8 mg NaF/l as the optimal growth-promoting quantity of NaF for corn. In the presence of aluminum salts and of 0, 0.5, 1 and 4 mg sodium fluoride, after 65 days corn plants yielded 18.6, 43.26, 11.4 and 10.54 g dry weight of vegetable matter. Fluorine in trace quantities is necessary for the optimal growth of corn in an artificial medium; at higher levels, however, fluorine is toxic and inhibits growth. The toxicity of fluorine can be attenuated by an excess of aluminum in the solution as a result of the probable formation of aluminum fluoride. The optimal concentration of fluorine varies from 250 to 800 microgram/l g depending on the concentration of aluminum in the medium.

10987 APTIC NO. 28444

Thellier, Michel, Abdelkader Ayadi, and Claude Tromeur

THE EFFECT OF IONIC INTERACTION OF CHLORIDE-BORATE AND OF IODIDE- BORATE ON THEIR ABSORPTION BY LEMNA MINOR L.

(Contribution a l'etude d'interactions ioniques chlorure-borate et iodure-borate lors de l'absorption par la Lemna minor L). Text in French, C. R. Acad. Sci. Paris, Ser. D, vol. 265:1687-1690, Nov. 27, 1967. 5 refs.

The effect of borate ions on the absorption of chloride and iodide ions by Lemna minor was studied using the radioactive tracers Cl-36 at 23 C with an illumination of 8000 Lux, and I-131 at 25.5 C with 600 Lux. The absorbed quantities of the tracer elements were measured with a Geiger counter. The concentrations of sodium chloride solutions tested ranged from 0.055 to 1 mM, those of potassium iodide from 0.04 to 4 mM. While the presence of borate ions in the test solutions of NaCl inhibited the absorption of Cl ions by Lemna minor, only a mild inhibition or none at all was noted in the case of the absorption of I ions. Because of the difference of the cations (sodium in the case of Cl, potassium in the case of I) no direct comparison can be drawn between the absorption of the two halogens. The absorption of I by the plant is thought to proceed by a much simpler mechanism than that of Cl.

10988 APTIC NO. 28445

Cormis, Louis de and Jacques Bonte

STUDY OF THE RELEASE OF HYDROGEN SULFIDE BY LEAVES OF PLANTS WHICH WERE EXPOSED TO SULFUR DIOXIDE.

(Etude due degagement d'hydrogene sulfure par des feuilles ayant recu du dioxyde de soufre). Text in French. C. R. Acad. Sci. Paris, Ser. D, vol. 270:2078-2080, April 27, 1970. 3 refs.

Leaves from the same level of a grapevine plant which was exposed for 15 minutes to an atmosphere containing 20 ppm SO2 were observed to release SO2 and H2S when brought into contact with pape impregnated with zinc acetate. Placed into darkness following fumigation, no H2S was released but SO2 was, irrespective of illumination. The same phenomenon can be achieved if stems of isolated plant leaves are dipped in a sodium sulfite solution. Absorption of sodium sulfide does not lead to a release of SO2. When exposed to light, part of the absorbed exogenic SO2 is reduced by the plant to H2S and released as such. The absorption of gaseous or liquid sulfide (H2S, Na2S) resulted in the release of H2S only, but did not cause leaf necrosis.

10989 APTIC NO. 28446

Bovay, E., A. Bolay, R. Zuber, P. Desbaumes, G. Collet, J.-P. Quinche, G. Neury, and B. Jacot

THE EFFECT OF CERTAIN COMBINED BORON FERTILIZERS ON THE ACCUMULATION OF FLUORINE IN VEGETABLES.

(Influence de certains engrais combines boriques sur l'accumulation du fluor dans les vegetaux). Text in French. Revue Suisse de Viticulture et Arboriculture (Lausanne), 1(2):30-33, March-April 1969. 7 refs.

Tests with grapevines, apricot trees, and forage plants performed on field lots, in potted plants, and in the laboratory disclosed that the use of certain combined fertilizers resulted in an accumulation of fluorine in the plant tissues, particularly in leaves. The fertilizers in question were manufactured by direct solubilization in a strong acid of a mixture of crude phosphates, of a potassium salt, and of a boron compound. An analysis of three different types of these fertilizers disclosed the presence of potassium fluoborate which as a result of its solubility is absorbed by the plant roots and accumulates in plant tissues. This accumulation was greatest at elevated temperatures, under strong illumination, and at low relative humidity and drought conditions, probably as a result of accelerated evapotranspiration. The manufacturers of the fertilizers in question were advised of these findings and the objectionable method of manufacture discontinued.

10990 APTIC NO. 28448

Tomson, N. M.

CONTENT OF METALS IN ATMOSPHERIC DUST AND THEIR EFFECT ON LIVING ORGANISMS.

(Soderzhaniye metallov v atmosfernoy pyli i vliyaniye ikh na zhivyye organizmy). Text in Russian. Gigiena i Sanit., no. 10:11-13, 1948.

Analysis of test animal and plant tissue ash may serve as an index of atmospheric pollution by heavy elements, their normal concentration as trace elements in living organisms serving as a criterion for establishing maximum allowable concentrations. Test animals were exposed to a polluted environment for 5 months. Dust levels ranged from 0.02 to 0.05 mg/cu m and lead oxides constituted the major heavy-element pollutant. Lead content in exposed animals reached 95.5 mg/kg in bone (as compared to 12.2 mg in controls) and 23 mg in liver (compared to 3.7 mg). Exposed plant leaves contained 15 mg/kg of lead as compared to 90-300 mg/kg in leaves from unpolluted areas.

10991 APTIC NO. 28459

Vins, Bohuslav

APPLICATION OF ANNUAL RING ANALYSES TO THE DETERMINATION OF SMOKE DAMAGE. II. CONTRIBUTION TO THE EVALUATION OF ANNUAL RING ANALYSES.

(Pouziti letokruhovych analyz k prukazu kourovych skod. II. Prispevek k hodnoceni letokruhovych analyz). Text in Czech. Ustav Vedeckotechnickych Informaci MZLVH, 35(4):263-280, 1962. 23 refs.

The most emission-endangered forested areas of Czechoslovakia are Krusne Hory and of Decinsky Sneznik. The condition of the forest cover today is such that not only the productivity of the forests but also their hydrological and ecological functions are in jeopardy. Measurements by annual ring analysis were made on trees at 102 selected experimental sites to determine the growth gain decrease due to air pollution. The decrease in growth gains was first noted in 1952. Up to 1958 this decrease was differentiated according to the degree of damage caused in different areas. Thus forests in the Chomutov area exhibited a 30% damage while forests in the Most and Teplice areas exhibited a 90% damage. In the Decinsky Sneznik area the growth gain drop was already noted in 1947 and from then on the annual growth impairment was about 15%. From 1953 on, this area suffered growth gain damage of the same magnitude as the Krusne Hory area. During 1954-1958, the growth gain decreases in four areas exposed to pollution of different severity were 23,37,40, and 70% respectively, compared to normal growth gains of trees grown in an unpolluted environment.

10992 APTIC NO. 28464

Wentzel, K. F.

ARE THERE IMMISSION-PROOF OR SMOKE RESISTANT TREES? (Gibt es immissionsfeste oder rauchharte Baeume). Text in German. Forstarchiv, 35(3):49-51, 1964.

Emission resistance is not a characteristic which a tree possesses or does not possess. Plants do not possess an absolute resistance or even a disposition to resistance to emission. There are only relative degrees of resistance of various plants to various pollutants at different developmental stages of plants. A general rule applies, namely, that the planting of conifers should be avoided where high emission levels prevail and deciduous trees should be planted instead. Of conifers and of deciduous trees, slow-growing species are more pollution resistant while species with a high assimilation capacity are less pollution resistant. Fertilization can counteract to some degree the harmful effect of pollutants on trees. Aside from grasses and other annual or short-lived culture plants, low bushes resis emissions best and longest. The lower the emission, the wider the choice of tree species that can be planted, including evergreens. In transition belts to lower emission levels, the relatively pollution resistant species like Thuja, Chamaecyparis, and black pine can be grown successfully. Picea and Abies can be grown only at very low emission levels.

10993 APTIC NO. 28471

Keller, Th.

THE PROBLEM OF TRAFFIC-INDUCED RESIDUES OF LEAD IN VEGETATION.

(Zum Problem der verkehrsbedingten Bleirueckstaende in der Vegetation). Text in German. Strasse Verkehr., no. 1: 1970. 5 refs.

The examination of live and dried moss from Sweden disclosed that from 1860 to 1968 the lead content of moss even in localities far removed from traffic increased from 20 ppm to 80-90 ppm, with the highest increase registered since about 1950. This is because the size of three-quarters of the emitted lead particles is less than 5 microns and thus remains suspended in the atmosphere to be distributed eventually over wide areas. The increase of lead in plants has been proven to be due to the emissions in automobile exhaust gases. Lower lead contents were found in conifer needles 6 m above ground than in needles growing 2 m above ground. For the most part, the lead remains in the roots or needles, only a minimal share is transported by conifers. Another indication that the lead in vegetation comes from exhaust gases is the decrease in the lead content of vegetation with increasing distance from highways. Thus, hay harvested 10-49 m from a highway contained 5-19 ppm lead while hay harvested in a strip 50-100 m from the highway contained only 2-8 ppm lead. Swiss authorities contemplate setting 10 ppm lead as the maximal permissible level of lead in the dry fodder of domestic animals. The planting of hedgerows alongside highways is recommended as a protective measure against the contamination of vegetation with lead emissions.

10994 APTIC NO. 28475

Bovay, Ernest

THE EFFECTS OF AIR POLLUTION ON PLANTS.

(Effets de la pollution de l'air sur les plantes). Text in French. In: Probleme der Luftverunreinigung durch die Industrie. Switzerland, Vogt-Schild S. A., 1969, p. 1-19. 126 refs.

A review is presented of sources of SO2, methods of measuring it in the atmosphere, maximal permissible SO2 levels, its mode of action on plant tissues, contributory factors, sensitivity of species and plant organs and methods of evaluating damage caused by SO2, including inspection, air analysis, analysis of the affected tissues, microscopic examination, and turbidimetric tests. Some of the same subjects are also discussed for fluorine emissions. Damage from these and other pollutants, including chlorine, hydrochloric acid, ammonia, hydrogen sulfide, zinc oxide dust, dust from cement plants, compounds of arsenic and molybdene, coal tar fumes, automobile emissions, ozone, peroxyacetyl nitrate, and smog, to a variety of plants is described.

10995 APTIC NO. 28476

Viel, M. G. and M. L. de Cormis

THE EFFECTS OF SULFUR DIOXIDE AND OF FLUORINE COMPOUNDS ON VEGETATION.

(Action de l'anhydride sulfureux et des composes fluores sur la vegetation). Text in French. Poll. Atmos. (Paris), vol. 7:381-391, 1965. 20 refs. (Presented at the Conference Internationale des Arts Chimiques, Paris, France, 1965.)

The study of the effects of SO2 and HF pollution on crops and vegetation grown around the industrial city of Lacq, France, which has daily emissions of 400 tons SO2 and 150 kg of fluorine, disclosed that in humid and cold years (1961, 1963) plant damage from SO2 predominated while in hot and dry years fluorine damage predominated. While SO2 causes burns immediately upon interaction with plant tissues, necroses produced by HF are slow in developing. Plants were the more susceptible to damage by SO2 the closer external factors came to achieving optimal photosynthetic activity. The sensitivity of luzerne to SO2 doubled when relative humidity was raised from 40 to 100%. Fruit trees manifested enormous differences in sensitivity as did grapevines. While the Petit Mauseign grapevine strain had an SO2 sensitivity threshold of 2.5 ppm, the Tannat strain's threshold was 15 ppm. Fluorine damage is best assessed on apricot trees, which are quite immune to SO2. The sensitivity threshold of plants to fluorine is 10 microg/cu m air. Analyses of sulfur and fluorine levels in plant tissue were of little help in diagnosing the cause of damage, in the case of sulfur because it is a major element of metabolism, and in the case of fluorine because some plants with a high fluorine content do not manifest damage while other plants with low fluorine content do. The various hypotheses of the mechanisms of damage by the two pollutants are discussed.

10996 APTIC NO. 28477

Garber, Kurt

EXPERIENCE WITH LEAF ANALYSIS IN SMOKE DAMAGE TESTS.

(Erfahrungen mit der Blattanalyse bei Rauchschadenuntersuchungen). Text in German. Angew. Botan., vol. 34:33-37, 1960. 3 refs.

The role of chemical analysis in examining plant material for damage caused by smoke is discussed. Most difficult is the diagnosis of SO2 damage, even in case of leaf discoloration, becaus this symptom is not specific. An increased content of sulfur in leaves can be an indication of damage by SO2 but this proof is not reliable, since plants can manifest elevated sulfur levels through intake from the soil. A quantitative micromethod for the detection of SO2 in fresh leaves has been developed by G. Bredemann and H. Radeloff. Hydrochloric acid and chlorine can also be detected by a micromethod (AgNO3) but it is no proof of damage because the natural chloride content in plants fluctuates widely. The same holds for NO2 and NO3. Ammonia can be detected microchemically with great reliability; fluorine can also be detected microchemically and positive tests usually indicate the cause of damage, but the fluorine test is not always reliable. A sensitive and reliable microchemical test also exists for asphalt and tar vapors. Thus, if the circumstances of the damage and local conditions are known, microchemical leaf analysis is useful as an auxiliary method in attributing damage to a specific agent. But leaf analysis by itself does not constitute conclusive proof.

10997 APTIC NO. 28479

Wentzel, K. F.

SENSITIVITY AND DIFFERENCES IN RESISTANCE OF PLANTS TO POLLUTION.

(Empfindlichkeit und Resistenzunterschiede der Pflanzen gegenueber Luftverunreinigung). Text in German. Forstarchiv, 39(9):189-194, Sept. 1968. 27 refs.

Until 1940 the SO2 concentration threshold beyond which damage to vegetation could be expected was considered to be 2 ppm. Recent experiments in chambers with controlled atmosphere show that the true threshold is around 0.2 ppm; and field experiments show that the most sensitive plants manifest deleterious effects from a median long-term exposure level of 0.02 ppm SO2. The sensitivity thresholds for hydrogen fluoride are even lower. These data help explain the wide extent of emission damage in old coniferous stand as well as the occurrence of such damage at distances 10-30 km from the source. The resistance of plants to pollution varies with a whole complex of factors, primarily with type of emission, growth conditions, the developmental stage of the plants, and nature of the exposure. The combination of these factors will govern the difference in resistance of a plant species. A distinction must be drawn between experimental and field resistance, the former judged by leaf sensitivity, the latter by livability and yield impairment. No sequence of plants can be compiled in their order of resistance that would be valid under all conditions. Generally, the danger to vegetation from pollution increases in the order of cereal crops, deciduous trees, horticultural crops, fruit trees, fodder crops, ornamental plants, and conifers.

10998 *APTIC NO. 28480*

Spierings, F.

STUDY OF THE EFFECTS OF FUMES THROUGH FUMIGATION EXPERIMENTS.

(Untersuchungen von Raucheinwirkungen durch Begasungsversuche). Text in German. Forschung und Beratung, Reihe C, Wiss. Ber. u. Diskussionsbeitr. (Muenster), vol. 5:56-63, 1963.

Fumigation experiments with controlled atmospheres of hydrogen fluoride and sulfur dioxide involving a number of grasses, plants, bushes, and trees, performed at the Institute voor Plantenziektenkundig Onderzoek in Wageningen (Holland), are described. These experiments were undertaken because of the damage from these pollutants to tulip and gladiolus crops. Experimental results with HF in the case of gladioli were in agreement with observations in the field both as to symptoms of damage and differences in resistance of various strains, but this was not the case with SO2 where laboratory and field results differed. HF was found to cause much greater damage than SO2 and some strains of both tulips and gladioli were found to be more pollution-resistant than others. The concentration range in the experiments for HF was from 0.015 to 0.2 ppm, for SO2 from 0.75 to 3.50 ppm. HF damage in ornamental monocotyledons can be quantitatively expressed by the injury index indicating the percentage length of the leaf rim where damage can be observed. SO2 damage is largely manifested by spots which are not easily measured. The degree of damage was expressed by the color difference between healthy and damaged leave in tomatoes, spinach, and endives, and was determined colorimetrically on alcoholic solutions of leaf pigments. Thus a 6-hr exposure of spinach to 0.5 ppm SO2 resulted in 14% damage, exposure to 1 ppm SO2 in 27% damage.

10999 APTIC NO. 28481

Wentzel, K. F.

SIGNIFICANCE, PROSPECTS AND LIMITS OF BREEDING SMOKE-RESISTANT TREE SPECIES IN THE LIGHT OF CENTRAL EUROPEAN STUDIES ON THE ECOLOGICAL EFFECTS OF FUMES.

(Bedeutung, Aussichten und Grenzen der Zuechtung relativ rauchharter Baumsorten im Lichte immissionsoekologischer Erfahrungen in Mitteleuropa). Proc. Congr. Intern. Union Forest Research Organizations, 14th, Munich, West Germany, 1967, vol. 5, sect. 24:536-555. 19 refs.

Damage to tree stands in central Europe from atmospheric pollution will become more extensive with time; thus, the breeding of pollution-resistant tree species assumes increasing importance. Since no differences in resistance could be detected in individual pine trees by experiments, interest focussed on spruce trees where such differences exist and were proven. But no spruce specimens were ever found which in resistance would have surpassed deciduous trees, whose regenerative power is a factor governing their considerable resistance to damage from pollution. Resistant spruce specimens were found to have comparatively massive needles, which also applies to other species of conifers. Thus there seems to be a connection between the anatomical structure of the needles and their degree of hardiness in a polluted atmosphere. Breeding of relatively resistant spruce trees by selection was started in 1956 and the first planting experiments in polluted areas were carried out in 1960. This work is of great importance for the reafforestation of approximately 100,000 hectares of forests in central Europe which are affected by chronic damage from pollution. Resistant spruce trees, should under conditions of a mildly polluted atmosphere, should produce for 20 years longer than less resistant strains. In areas exposed to severe pollution, only deciduous trees should be planted.

11000 APTIC NO. 28482

Kisser, J.

PROBLEMS OF THE CULTIVATION OF SMOKE-RESISTANT TREE VARIETIES.

(Probleme der Zuechtung rauchresistenter Holzarten). Text in German. Proc. Congr. Intern. Union Forest Research Organizations, 14th, Munich, West Germany, 1967, vol. 5, sect. 24:510-517.

In order to prevent further spread of damage to forests from industrial air pollution, new legislation will have to limit the emission of pollutants. On the part of the silvicultural sector, two approaches are available to counteract the noxious effects of pollution. One is the observation that a judicious supply of minerals to trees increases their resistance to emmissions, but mor experimental work will be required before this measure can be introduced on a large scale. The second possibility of fighting pollution rests on the recognition that differences in resistance to pollution exist in individual trees of the same species. This has been confirmed both from observations in pollution-damaged timber stands and by experimental work. Whether the difference in resistance is anatomical or physiological is not yet known, although the latter seems the more probable. It should be possible to obtain by selection and cultivation conifers able to prosper in conditions under which present-day conifer populations die. The one remaining problem in this approach is the question of propagation. Propagation of resistant species by seeds is not possible; thus the propagation will have to be accomplished either by grafting, or better still, by rooting of cuttings from resistant parent trees.

11001 APTIC NO. 28483

Baumeister, Walter and Helmut Burghardt

THE PHYSIOLOGICAL EFFECT OF FLUORIDE ON TOMATOES AND SPINACH.

(Untersuchungen ueber die physiologische Wirkung von Fluorid bei Tomaten und Spinat). Text in German. Flora (Jena), vol. 144: 213-228, 1956. 23 refs.

The effect of various concentrations of sodium fluoride on tomatoes and spinach was studied under conditions of hydroponic cultivation. The nutrient medium was a solution of 3 salts with Mn, B, Zn, and Fe as additives. In concentrations of 25 and 100 mg F/l for spinac and of 50 and 150 mg F/l for tomatoes, the effect was in all cases deleterious. The weights of the sprouts and roots, apparent CO2 assimilation values, and pigment contents decreased while respiration intensity rose. Leaves yellowed at the tips; their rim dried up or curled up. At the higher concentration levels the plants died after about 4 weeks. At lower concentrations of 1, 5, 10, and 25 mg F/l no effect on apparent CO2 assimilation, respiration, and pigment content was noted. But while in the case of spinach the live weight of the plant was reduced by up to 40%, the weight of tomato plants increased by up to 60% and did not fall off sharply until a 50-mg F/l concentration was reached. In tomatoes the roots, and in spinach the leaves, were most affected. The difference in the reaction of both species may be due to the circumstance that the tomato is free of fluorine while spinach is one of the fluorine-rich plants. Thus, at least on some plants, fluorine seems to have the effect of a trace mineral.

11002 APTIC NO. 28529

Yamaga, S., Kaoru Ohmori, Haruko Saito, and Akemi Tanizaki

THE DIFFUSION OF LEAD IN AUTOMOBILE EXHAUST GAS.

(Jidosha haiki gasuchu namari no kakusan ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Polltuion), 5(1):256, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 10th, 1970.)

The pattern of diffusion of lead from automobile exhaust gas was investigated by studying the amount of lead adhering to or contained in leaves of ginkgo trees growing along less-travelled roads that cross a busy highway. Samples were dried at 100 C, then pulverized, and a definite portion wet-digested. After extraction by dithizone, lead was determined by atomic absorption spectrophotometry. The same routine was followed for surface soil at the root of the trees. Leaves at heights of 3 and 6 m were examined. At one of the two sampling sites, the lead content in surface soil tended to decrease with distance from the trunk highway. At both sites, the amount of lead in leaves tended to decrease with distance from the main highway. Lead was found in larger amounts in the leaves at the lower level. Also, those leaves collected in October contained more lead than those assembled earlier in the year.

11003 APTIC NO. 28589

Mellanby, Kenneth

ENVIRONMENTAL POLLUTION.

Chem. Brit., 6(5):198-200, May 1970.

In Britain, the harmful effects on vegetation of sulfur have seldom been demonstrated. It is likely, however, that subtle effects of air pollution will eventually be demonstrated and that new air pollutants with unforseen effects will be found. These will require methods of control other than the dispersion of pollutants from tall chimneys. Water pollution by industry is a much more obvious problem, though great regional differences exist. Existing legislation and technology appear adequate to purify waters to the extent that both organic matter and algal growths are controlled. Nevertheless, research is needed to make sophisticated treatments more efficient and more economical. The most difficult problems for the future are controlling insecticides and preventing eutrophication of rivers by nutrient salts.

11004 APTIC NO. 28597

Taziyama, Tetsuro and Hiroki Arikado

STUDIES ON THE MECHANISM OF TOXIC GAS INJURY TO CROP PLANTS. II. THE RELATIONSHIP BETWEEN SULFUR DIOXIDE AND LIGHT IN INJURY TO BARLEY AND RAPE.

(Sakumotsu no gasu shogai ni kansuru kenkyu. II. Hikari no umu to natane oyobi hadaka-mugi no aryusan gasu shogai tono kankei). Nippon Sakumotsu Gakkai Kiji (Proc. Crop Sci. Soc. Japan), vol. 37:608-613, 1968. 7 refs. Translated from Japanese. 10p.

The injurious effects of sulfur dioxide on crop plants was studied under a light intensity of 20 k lux and in the dark. The plants were exposed to 20 ppm SO2. The injury observed on the leaves of both rape and barley, even under the dark condition, increased in degree as the exposure time was extended. Rape, in the flowering stage, showed no significant difference in susceptibility to the gas whether the plants were in the dark or light; in the vegetative stage, the plant was more severely injured in the dark than in the light. Barley, however, was more severely injured in the light tha in the dark. The leaves of both plants absorbed sulfur whether in the light or dark. Particularly with rape, the sulfur content of thy leaves increased linearly with longer treatment time, showing a higher sulfur content in the light than in the dark. The degree of injury appearing on the leaves correlated positively with the sulfur content of the leaves, but in rape the considerably high sulfur content did not cause any visible injuries to the leaves. (Author summary modified)

11005 APTIC NO. 28600

Cormis, L. de

ABSORPTION OF FLUORINE SOLUTIONS AND MIGRATION OF FLUORINE IN THE TOMATO.

Ann. Physiol. Veg., 10(3):155-169, 1968. 20 refs. Translated from French. 28p.

Studies were made to determine whether fluorine absorbed by the leaves of tomato plants can be displaced toward the roots and whether the fluorine contained in the soil can be absorbed by the roots and then displaced toward the leaves. In the first part of the study, fluorine was introduced to the aerial parts of tomato plants, either by soaking the leaves or the leaf stalks with a hydrofluoric acid solution of 4 g/l of fluorine in two tests, the first lasting 2 minutes, the second, 4 minutes. The soaked leaves were rinsed twice in distilled water and their fluorine contents were measured and proved to be, respectively, 319 and 409 ppm, indicating that absorption of the fluorine ion is rapid. In the second part of the experiment, tomato plants were grown in various cultivation environments to which fluorine solutions were added. Tabulated data for both parts of the experiment revealed that fluorine moves normally from the leaf stalk of absorption to the leaflets, the stems serve essentially as a passage area, an appreciable quantity of fluorine is still found in the stem at the time of collection, there is practically no passage of fluorine to the roots, and that if the cultivation environment contains a large quantity of fluorine, the latter is not noticeably displaced toward the leaves even if it is absorbed in small parts of the roots.

11006 APTIC NO. 28647

Hasegawa, Toshio, Yoshiaki Yamazaki, Hideo Hayashi, and Masaaki Takahashi

ON THE ATMOSPHERIC FLUORIDE POLLUTION. PART III.

(Fukkabutsu ni yoru taiki osen chosa. Dai-3-po). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):225, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

The effects of hydrogen fluoride and sulfur dioxide emitted from a hydrofluoric acid plant in Suita, Osaka Prefecture, were investigated. Samples of the surrounding atmosphere, agricultural crops (rice plants), and soil were analyzed for fluorine and sulfuric acid ions. In addition, the wind speed and wind velocity were measured. Fluorine was analyzed by the alizarine complex method, and sulfuric acid ions by the barium chromate method. The fluorine content of rice plants was 340-379 ppm for those badly damaged, 200-210 ppm for those mildly damaged, and 42-76 ppm for those not damaged at all. The concentrations also tended to decrease with distance from the factory. In soil, the fluorine concentration was 12-38 ppm, and there was not much difference between the polluted and the control areas. The concentration of fluorine at the emission source, measured by dry-type cylindrical filter methods showed 86.2 mg of fluorine/400 sq cm/100 hr. The meteorological data showed that there is a relationship between the frequency of wind direction and the concentration of the pollutants downwind from the emission source.

11007 APTIC NO. 28679

National Academy of Sciences-National Research Council, Washington, D. C., Subcommittee on Fluorosis Problems

THE FLUOROSIS PROBLEM IN LIVESTOCK PRODUCTION.

Pub.- 824, 29p., 1960. 135 refs.

Colored photographs provide definitive diagnostic criteria for determining the incidence and severity of fluorosis in livestock. The development of fluorosis depends on the total fluorine intake, which varies with physiological, phenomena such as growth, heavy lactation, and pregnancy. Sources of fluorine which may affect livestock are mineral feed supplements, water contamination, forage contaminated with soil particles from road dust or as a result of close grazing, forage containing an elevated F content induced by atmospheric fluorines from around industrial plants, and feed concentrates. The tolerance level from a soluble source is 30-50 ppm in the ration for a lactating dairy cow. Rock phosphate fluorine, however, would be tolerated up to 60-100 ppm. Tolerance levels for swine and poultry are higher. The most definitive quantitative measure of the degree of fluorosis is the extent of retention of fluorine in the skeleton. The most sensitive biological reaction to fluoride is that of the developing tooth. Suspected fluorine toxicosis may be diagnosed tentatively by the general health and condition of the herd. Clinical diagnosis supported by chemical analysis can positively identify fluorine toxicosis. The tolerance of an animal to ingested fluorine is increased by consumption of green forage, by supplementing the ration with certain soluble aluminum compounds, by including high levels of calcium in the ration, and by adequate nutrition. Tolerance to fluorine varies with species, and the level tolerated depends upon the form of the fluorine ingested.

11008 APTIC NO. 28680

Taniyama, Tetsuro and Hiroki Arikado

STUDIES ON THE MECHANISM OF TOXIC GAS INJURY TO CROP PLANTS. V. EFFECTS OF SULFUR DIOXIDE ON THE PHOTOSYNTHESIS OF RICE PLANTS.

(Sakumotsu no gasu shogai ni kansuru kenkyu. V. Shito no tansandoka-sayo ni oyobosu aryusan gasu no eikyo). Nippon Sakumotsu Gakkai Kiji (Proc. Crop Sci. Soc. Japan), 38(4):592-602, 1969. 10 refs. Translated from Japanese, 14p.

The injurious effects of sulfur dioxide on photosynthesis and absorption of sulfur into leaves of rice plants were studied. It is shown that both visible actual photosynthesis are depressed by fumigation with sulfur dioxide. Visible photosynthesis was completely inhibited one hour after the plant was exposed to the gas, after being treated continuously at high concentrations such as 20 and 40 ppm. At concentrations of 6, 10, and 40 ppm, the depression of visible photosynthesis caused by fumigating with sulfur dioxide for one hour, was restored to the original state two hours after the gas was removed, but was not restored after fumigations at concentrations of 30 and 70 ppm. When rice plants were fumigated with sulfur dioxide at concentrations up to 20 ppm, the sulfur content in the leaves increased significantly with only a slight increase as the concentrations became higher. The content of sulfur absorbed in the leaves did increase, however, in proportion to the length of the fumigation period. (Author summary modified)

11009 APTIC NO. 28762

Hasegawa, Toshio, Yasumasa Yamada, Masaharu Yoshida, and Hikojiro Yoshikawa

DETERMINATION OF SULFUR CONTENTS IN PLANTS. PART I.

(Shokubutsuchu no iobun no sokutei. Dai-1-po). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):37, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

Sulfur in pine leaves was analyzed by means of combustion in a high-frequency furnace and by coulometry. The sample was mixed with alumina powder and electrolyzed iron powder in a crucible and was combusted in a high-frequency oven with oxygen flow of 1 l/min. When the amount of alumina was over 1.2 g for 1.0 g of iron, fusion was incomplete; when alumina was less than 1.0 g, rapid combustion was observed. When alumina was fixed at 0.6, at least 0.6 g of iron was necessary for complete fusion. Since pine leaves contain carbon, chlorine, nitrogen, and phosphorus in addition to sulfur, those elements were also analyzed. Analytic data for sulfur and chlorine (the samples were taken from pines growing on the sea shore) are tabulated according to soluble S, insoluble S, soluble and insoluble S together, Cl, and total S (affected by amount of Cl).

11010 APTIC NO. 28766

Taniyama, Tetsuro, Hiroki Arikado, and Hisamitsu Suzuki

RELATION BETWEEN PHOTOSYNTHESIS AND EVAPORATION OF RYE LEAF BY SO2.

(SO2 ni yoru hadakamugi no kogosei to yomen josan tono kankei narabi ni kogosei kara mita SO2 teinodo genkaichi). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution, 5(1): 154, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

A newly devloped carbon dioxide analyzer was used to measure the speed of photosynthesis inhibition by SO2 and the threshold value of SO2 at which photosynthesis inhibition occurs. In addition, the surface evaporation of rye leaf was measured by means of a thermopile. Three levels of air induction and four levels of light intensity were used to observe the effect of the various air induction rates of the assimilation box on the evaporation rate. There is a relationship between light intensity and evaporation rate, but the effect of light intensity increases with increasing air flow rate. After the above preliminary experiment, the speed of inhibition of photosynthesis due to SO2 was studied. Ten minutes after contact with SO2, the reduction in photosynthesis was 45% for 2 ppm, 75% for 5 ppm, and 80% for 10 ppm SO2. The apparent photosynthesis for 5 and 10 ppm sometimes showed negative values. Subsequent analysis of data showed that the reduction in surface evaporation and the apparent reduction in photosynthesis decrease proportionally with SO2 concentration.

11011 APTIC NO. 28769

Sato, T.

RELATION BETWEEN AIR POLLUTION AND SULFUR CONTENT IN TREE LEAVES.

(Taiki osendo to jumoku no yochu ioganyuryo no kankei). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1): 153, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

Leaves of zelkova trees were examined for their sulfur content and its variation over time. Samples were taken from the western suburbs and from the old city of Tokyo. Total sulfur content was much higher in the old city. It increased rapidly from May to June (0.6 ppm and over) and then leveled off. In the suburbs, total sulfur content was more or less constant from spring to summer at about 0.2 ppm. The content of water-soluble inorganic sulfur was always higher in the polluted old city than in the suburbs; it increased rapidly from the end of May to the end of June, then tapered off in August. The content of water-soluble organic sulfur decreased from spring to summer, but no close connection with pollution was observed. The unusually high leaf face exhibited by zelkova trees from the end of June to the end of July in recent years corresponds quite closely to air pollution observations obtained by the lead peroxide candle method.

EFFECTS-MATERIALS

11012 APTIC NO. 27881

Biestek, Tadeusz

CORROSION RATE OF ELECTRODEPOSITED ZINC COATING ON STEEL IN TYPICAL NATURAL ATMOSPHERES IN POLAND.

(Szybkosc korodowania powlok cynkowych w typowych naturalnych atmosferach w Polsce). Prace Inst Mech. Precyzyjnej, vol. 13:30-38, 1965. 25 refs. Translated from Polish by Felicja Zeromska, Central Inst. for Scientific, Technical and Economic Information, Warsaw (Poland), Scientific Publications Foreign Cooperation Center, 18p., 1967.

NTIS: TT 67-56036

Average corrosion rates were determined for zinc coatings on steel in typical natural atmospheres in Poland. The atmospheres in decreasing order of corrosiveness are industrial, urban, suburban, seaside, and rural. The average corrosion rates vary widely, demonstrating the impact of local corrosion media and, possibly, the influence of the season in which tests were initiated. In all atmospheres, the rate of corrosion was highest for electrodeposited zinc coatings in a cyanide bath (ZnCN) and lowest for electrodeposited coatings in a sulfate bath (ZnS). The corrosion rates, which can be used for establishing the appropriate thickness of coatings, lie within the range determined in other countries.

11013 APTIC NO. 27883

McGeary, F. L., T. J. Summerson, and W. H. Ailor, Jr.

ATMOSPHERIC EXPOSURE OF NONFERROUS METALS AND ALLOYS--ALUMINUM: SEVEN-YEAR DATA.

Am. Soc. Testing Mater. Spec. Tech. Publ. no. 435:141-174, 1968. 7 refs.

Results are presented for weathering tests on 34 wrought aluminum alloys exposed seven years at four sites in the United States. Also included, for comparison, are data on three additional aluminum alloys exposed six years at five sites in England. The self-limiting corrosion characteristics were observed on weather surfaces at all test sites in both countries. The industrial sites (Sheffield and London) in England revealed a significantly deeper weathering effect on groundward, sheltered surfaces. This probably reflects accumulation of chemical contaminants on these surfaces which cannot be cleaned by rainfall. Comparing the U. S. and English sites on the skyward (exposed) surfaces: the industrial English locations appeared slightly more aggressive than Newark; the seacoast U. S. locations were more aggressive than the English seacoast locations; and a rural site in the U. S. was less aggressive than a semi-rural site in England. The test program will be continued to produce 20-yr exposure data. (Author conclusions modified)

11014 APTIC NO. 28096

Mallonee, William C.

BONDING POLYAMIDE ARTICLES BY GASEOUS SULFUR DIOXIDE AND CHLORINE.

(Monsanto Co., St. Louis, Mo.) U. S. Pat. 3,556,895. 3p., Jan. 19, 1971. 3 refs. (Appl. Nov. 4, 1968, 10 claims).

A method is described for bonding polyamide filaments by means of gaseous sulfur dioxide and chlorine to produce non-woven fabrics. The filaments comprising a non-woven fabric have in the past been bonded by the use of external binders or by softening the filaments with heat, solvent, or plasticizer and subjecting them to pressure while in the softened state. However, use of an outside binder presents problems in uniform applications and limits the properties of the entire web to those of the binder, while solvent bonding is not easily controlled and frequently tends to alter the aesthetic properties of the web. The present invention comprises the bonding of two touching polyamide articles along their contiguous surfaces by exposure to an activator such as a gaseous mixture of sulfur dioxide and chlorine followed by desorbing or removing the gas. For uniform treating conditions and handling convenience, the activating gas should be maintained at about 20-25 C. Bonding of polyamide articles by a combination of gases which individually have no lasting effect on the polyamide articles is quite surprisin and can best be explained as a synergistic action.

11015 APTIC NO. 28159

Baewa, W., Ch. Petrow, W. Toschkow, and D. Nenow

OXIDATION OF SILVER THROUGH AC CURRENT OF 50 HZ IN AQUEOUS SODIUM CHLORITE SOLUTION.

(Oxydation von Silber durch Wechselstrom von 50 Hz in waessriger Natriumchloritloesung). Text in German. Werkstoffe Korrosion, 22(2):143-148, 1971. 7 refs.

Silver and silver-coated objects develop a brownish-black film due to traces of hydrogen sulfide in ambient air. The silver sulfide formation can be prevented by various methods. The silver can be rendered passive by chemical treatment in aqueous chromate, chloride, and sulfur-containing salt solutions at 60 to 80 C. A new method that prevents silver corrosion by oxidation with AC current of 50 Hz was tested. At 50 Hz AC and a current density of 10 A/sq dm, a shiny black, corrosion resistant oxide layer was obtained in silver objects placed in aqueous solution with 80 g/l sodium chlorite. The temperature of the solution was 60 C and the duration of treatment five minutes. Through optical and electron microscopical studies, it was determined that the coating was characterized by low porosity. It was uniformly distributed over the entire surface of the metal.

11016 APTIC NO. 28217

Morley, D. J.

UPHOLSTERY FABRIC FADING BY IMPURITIES PRESENT IN THE AIR.

Bull. Furniture Ind. Res. Assoc. (England), 1967: p. 2-3, March 1967.

In recent years the range of fibers used for upholstery fabrics has widened considerably. While dyes of adequate light fastness are generally available for these new fibers, some of the dyes are very sensitive to fading by exposure to gases which occasionall contaminate the atmosphere. Thus burnt gas fumes, i.e., those containing nitrogen oxides, affect a high proportion of dispersed dyes. The various fibers on which these dyes are used are listed and their relative susceptibility to gas fume discoloration compared. Discoloration occurs most frequently on acetate fabrics, which can, however, be protected by the application of colorless inhibitors during the dyeing process. Fading following exposure to ozone or formaldehyde vapors is comparatively rare in the case of upholstery fabrics.

11017 APTIC NO. 28334

Erdoes, E., P. Brezina, and R. Scheidegger

PROPERTIES AND REACTIONS OF CHROMIUM SULFIDES AS PRODUCTS OF HIGH-TEMPERATURE CORROSION OF NICR2OTIAL (NIMONIC 80 A).

(Ueber Eigenschaften und Reaktionen von Chromsulfiden als Produkte der Hochtemperaturkorrosion von NiCr20TiAL (Nimonic 80 A). Text in German. Werkstoffe Korrosion, 22(2):148-157, Feb. 1971. 11 ref.

The sulfide phase on corroded gas-turbine blades made of NiCr20TiAl (Nimonic 80 A) was determined by X-ray diffraction and electron beam microanalysis. The phase consisted of chromium nickel sulfide with variable nickel and titanium content. This phase is isotypical with Cr3S4. The range from Cr3S4 to NiCr2S4 was studied by substituting nickel for chromium in Cr3S4. No further phases were found. Acceptance of nickel into the lattice of Cr3S4 is accompanied by a small volume concentration. The presence of titanium (at least less than 8%) does not change the structure. Thermoanalytic and x-ray photographic experiments were carried out to study the reactions of synthetic chromium sulfides in inert gases, in medium high-vacuum range, in oxygen, and with oxides and sulfides of the scale layer (Cr2O3, NiO, NiCr2O4, Ni3S2). With chromium nickel and chromium nickel titanium sulfide, changes occur in the solid phase. On oxidation, the sulfur-rich chromium sulfides and nickel sulfide Ni3S2 are formed. In the reaction with NiO or NiCr2O4, nickel sulfide Ni3S2 develops.

11018 APTIC NO. 28335

Rosborough, D. F. and W. Hansen

STUDIES OF HIGH-TEMPERATURE CORROSION OF OIL-FIRED BOILERS OF POWER PLANTS WITH NEAR STOICHIOMETRIC COMBUSTION PROCESS.

(Intersuchungen ueber Hochtemperaturkorrosionen an oelgefeuerten Kraftwerkskesseln mit nahstoechiometrischer Feuerfuehrung). Text in German. Mitt. Ver. Grosskesselbesitzer, 51(1):51-57, Feb. 1971. 9 refs.

Experiments on high-temperature corrosion were conducted at two power plants. Both boiler furnaces were operated with an air surplus of less than 2%. In one plant, austenitic steel AISI 316, together with two ferritic steels (1% Cr and 8% Cr), were used for pipes; in the other plant, the same austenitic steel and a ferritic steel (12% Cr) were used. The experiments lasted for more than 1000 hours at metal temperatures to 650 C. At metal temperatures corresponding to a steam condition of 565 C, significant high-temperature corrosion occurred. This was particularly true for the second plant where the pipes were exposed to high flue-gas temperatures and a high flame radiation. The ferritic metal alloys proved to be more resistent than the austenites. Corrosion was due primarily to oxidation and sulfide formation, although the oxygen concentration in the flue gas was only 0.1 to 0.2%. It is concluded that near stoichiometric combustion is advantageous with respect to low-temperature corrosion and boiler efficiency. It does not however, prevent high-temperature corrosion in boilers designed for higher steam temperatures.

11019 APTIC NO. 28587

Hoar, T. P.

THE PROBLEM OF CORROSION.

Chem. Brit., 6(5):204-205, May 1970.

The most corrosive gaseous pollutants in the atmosphere are sulfur oxides from the combustion of sulfur fuels and volatile gases from the chemical industry. The major solid pollutants of industrial atmospheres are carbon, siliceous dust, ammonium sulfate, and, in steelmaking areas, ferric oxide. These solid pollutants are often responsible for the initial sites of corrosion. Sulfur oxides are seriously detrimental to ferrous alloys and zinc, but not very serious for exposed lead and copper. In England, considerable use is made of greatly improved protective systems for metals, notably for structural steel. Less use is made of the 'weathering' steels. A variety of corrosion problems are posed by ground and water pollution in addition to atmospheric pollution. For example, sulfate reducers in soil can accelerate corrosion of steel structures and inorganic fertilizers may lead to marginally increased corrosion of agricultural equipment. There is also the enhanced corrosion of the undersides of car bodies by the salting of roads.

11020 APTIC NO. 28801

Rahmel, A. and J. A. Gonzalez

METALLOGRAPHIC STUDIES OF THE COMPOSITION OF SCALE AFTER OXIDATION OF IRON BETWEEN 700 AND 900 C IN CO/CO2 MIXTURES WITH SMALL CONCENTRATIONS OF COS, H2S, OR SO2.

(Metallographische Untersuchungen ueber den Aufbau des Zunders nach Oxidation von Eisen zwischen 700 and 900 C in CO/CO2-Gemischen mit kleinen Gehalten an COS, H2S oder SO2). Text in German. Werkstoffe Korrosion, 22(4):283-289, April 1971. 11 refs.

The results of metallographic studies of the scale formed in carbon monoxide/carbon dioxide mixtures with small concentrations of carbonyl sulfide, hydrogen sulfide, or sulfur dioxide are discussed. Ferric oxide develops in COS-or H2S- containing gases only if the diffusion of the iron ions and electrons through the scale layer is faster than the reaction at the phase boundary scale/gas or the deliver of sulfur compounds from the gas to the surface of the scale. In this case, no equilibrium exists on the scale surface with the gas phase. The iron ions and electrons arriving there react with the oxygen of the CO2 for lack of adsorbed sulfur atoms or sulfur ions. If the diffusion in the scale is the slowest process, equilibrium can be established at the boundary scale/gas and only the thermodynamically stable phase FeS is formed. Iron oxide and FeS grow separate from each other rather far apart. This may be due to a surface diffusion of sulfur and oxygen atoms over large distances or a preferred absorption of S-containing compounds on FeS and of CO2 on FeO.

EFFECTS-ECONOMIC

11021 *APTIC NO. 27893*

Linzon, Samuel N.

ECONOMIC EFFECTS OF SULPHUR DIOXIDE ON FOREST GROWTH.

Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 24p., 1970. 7 refs. (Presented at the Air Pollution Control Association, Annual Meeting 63rd, St. Louis, Mo., June 14-18, 1970, Paper 70-132.)

Investigations were carried out from 1953 to 1963 in the Sudbury smelter district of Ontario to determine the long-term chronic effects of sulfur dioxide on yield, growth, and survival of plant life. Since eastern white pine is the most susceptible coniferous tree to SO2 injury, it was selected as the indicator tree to determine the degree and extent of injury in the Sudbury area. An estimate was made of the loss in income suffered by the owners of wood or the producers of wood products in the Sudbury area as a result of SO2 air pollution, by utilizing the white pine volume growth loss data. The number of white pine trees displaying foliar injuries increased with increasing age of foliage. Foliar injuries and premature defoliation resulted in decreased radial and volume growth of the trees, while repeated foliar injuries resulted in early death of the trees. A secondary effect of SO2 pollution was the increase in bark abnormalities on white pine, and the decrease in the incidence of biological injuries. The disease blister rust was practically non-existent in the areas closest to the sources of the sulfur fumes. Excessive white pine mortality occurred as a result of SO2 chronic injury, with an average of over three times as many trees dying annually in the inner fume zone than in the non-fume zone. Because of excessive foliar injuries and tree mortality, white pine forests experienced a negative volume growth over the ten-year period. For white pine alone, a loss of 117,000 dollars was estimated to occur annually in the inner fume zone of the Sudbury smelter area. (Author abstract modified)

11022 APTIC NO. 27968

Dabelstein, Werner

PROBLEMS PRESENTED BY LEAD IN GASOLINE.

(Zur Problematik der Benzinverbleiung). Text in German. Erdoel Kohle (Hamburg), 24(1):37-40, Jan. 1971. 16 refs.

The various aspects and implications of lead additives in motor fuels are discussed such as the effects of lead alkylates on the anti-knock performance of modern motor fuels, the consequences of the elimination of lead additives on manufacturing costs, on engine life and design. The recently published report about elevated levels of lead in the blood of city employees of Frankfurt/M. is not considered conclusive proof of impairment of human health because similar levels were found in the blood of inhabitants of New Guinea who are not exposed to internal combustion engine exhaust gases (26 microg/100 ml blood and 22 microg/100 ml blood respectively). The difficulties which the lowering of harmful pollutant levels from internal combustion engines present are due to the circumstance that all measures designed to lower the emission of CO and of hydrocarbons before and during combustion lead to increased generation of nitrogen oxides and thus only control measures instituted after combustion are effective. A viable alternative to the use of lead compounds in gasoline is the use of lead-free gasolines with a low octane number in engines with a high piston displacement and small compression. Such engines generate less nitrogen oxides and run noiselessly. The German Federal Ministry of the Interior and the petroleum industry reached an agreement whereby the lead content would be reduced to 0.4 g/l as o 1 January 1972 and to 0.15 g/l as of January 1977.

11023 APTIC NO. 27971

Rushton, J. D.

HOW MUCH WILL POLLUTION CONTROL COST? AND WHO WILL PAY FOR IT? Paper Trade J., 155(11):60-63, March 15, 1971. 14 refs.

In an oligopolistic industry such as the pulp and paper industry, firms tend to ignore a price increase by a competitor and respond only to a price decrease. Consequently, if a firm must spend large sums of money for pollution control equipment to meet stringent standards, it will be at a severe price/profit disadvantage in comparison with firms that do not install such equipment. Misallocations of resources will occur unless the market is corrected by applying consistent standards to all firms. After application of the standards, direct regulations, charges, or payments can be applied to allocate correctly the costs of pollution control so that the consumer or firms benefiting from the products share the costs. Once the economic method of allocating costs has been chosen, a discussion of the percentage costs borne by industry, government, and the consumer is irrelevant. In the end, all costs come back to the consumer: he either pays higher taxes, higher prices, or receives less compensation for his share of the ownership of the industry (that is, as stock, wage increases, benefits, etc. (Author conclusions modified)

11024 APTIC NO. 28063

Adam, Robert

COSTS OF THE FIGHT AGAINST WATER AND AIR POLLUTION AND REFUSE IN THE USA.

(Die Kosten des Kampfes gegen Wasserverschmutzung, Luftverpestung und Muell in den USA). Text in German. Staedtehygiene, 22(1):14-16, Jan. 1971.

During the next five years, 5.9 billion dollars will be spent in the United States for fighting air pollution due to automobile exhausts, while 5.4 billion dollars will go into combating industrial emissions. Carbon monoxide, particulates, sulfur oxides, hydrocarbons, and nitrogen oxides are the most important pollutants. The 103 million cars in the United States emit annually 91 million tons of toxic gases. Beginning in 1975, device must be installed on automobiles to reduce the hydrocarbon emission by 97% and the carbon monoxide emissions by 91%. Due to fuel combustion in 60 million homes, 100,000 industries, 307,000 boilers, and 410 power plants, some 46 million tons of pollutant gases are emitted annually. It is argued that the costs for combating air pollution, 2.6 billion dollars annually, will be made up by a gain of 11 billion dollars. Losses of agriculture due to pollution are estimated to run to about 500 million dollars annually.

11025 APTIC NO. 28140

Semrau, Konrad T.

SULFUR OXIDES CONTROL AND METALLURGICAL TECHNOLOGY.

J. Metals, 23(3):41-47, March 1971. 48 refs. (Presented at the Extractive Metallurgy Division Symposium on Copper Metallurgy, TMS Annual Meeting, Denver, Colo., Feb. 15-19, 1970.)

Technical means already exist for controlling sulfur oxide emissions and recovering sulfur compounds from the smelting of copper, lead, and zinc. However, the cost of control is roughly proportional to the volume of offgas that must be treated, and the cost of sulfur recovery from certain operations will remain relatively high until these volumes are reduced. Changes in smelting processes and in process enclosures can greatly decrease the volume of offgas generated or the amount of air infiltrating the offgas. Requirements for air pollution control can be expected to be a major influence in the next decade on the rate of introduction of new metallurgical technology and practice. Not all the potentially recoverable sulfur from U. S. smelting operations can be disposed of directly as sulfuric acid within economic shipping ranges of production sites. A portion of the SO2 will hav to be converted to elemental sulfur, economical conversion demanding rich, low-volume offgases even more than does production of sulfuric acid. (Author abstract modified)

11026 APTIC NO. 28346

Asano, Takao

PRESENT STATE AND FUTURE OF ENVIRONMENTAL POLLUTION PREVENTION INDUSTRY-NO 3. PROBLEMS OF THE INDUSTRY.

(Kogaiboshi sangyo no genjo to shoraisei-3, Kogaiboshi sangyo no mondaiten). Text in Japanese. Yosui to Haisui (J. Water Waste), 13(2):139-145, Feb. 1971.

The problems involving the 'environmental pollution prevention' industry are discussed. The purchase of pollution-prevention equipment inevitably results in higher manufacturing costs on the part of the purchaser, since this equipment does not directly contribute to productivity. According to a survey, 112 of 358 firms having pollution prevention devices reported that installation of the prevention equipment or facilities resulted in a decrease in profit. Only 2%, or 7 out of 358 firms surveyed, were able to offset the higher cost by increasing the unit sale price. For 18 representative firms, capital investment appropriated for environmental pollution prevention equipment and facilities in 1970 accounted for 7% of the total investment for the year. Turnover increased by 16% and after-tax profits by 11%. Profit would have been 16% had no money been spent for pollution prevention. This will also limit the profitibality of the industry itself. Whether or not the extra cost the pollution prevention equipment has incurred should be reflected in the sale price to end users is a delicate matter yet to be settled. It should be kept in mind that if this extra cost is to be borne by a particular social stratum, strong resistance would arise. The industry's technological progress is lagging behind requirements. A practical version of an electrically driven automobile, talked about for a long time as the most effective means of avoiding air pollution from carbon monoxide is not yet available. A smoke desulfurization device is still far from satisfactory. Also there is no satisfactory incineration device for plastic wastes. These should be not only technically satisfactory, but available at reasonable prices. Weighted in terms of its share in total turnover of a particular company, a survey indicated that only 17 out of 95 firms surveyed had 5% or more of the total turnover attributed to this branch of the pollution prevention industry.

11027 APTIC NO. 28435

Teller, Azriel Arthur

AIR POLLUTION ABATEMENT: AN ECONOMIC STUDY INTO THE COST OF CONTROL.

Johns Hopkins Univ., Baltimore, Md., Dept of Economics, Thesis (Ph.D.), Ann Arbor, Mich., Univ. Microfilms, Inc., 1967, 241p. 56 refs.

An economic basis for air pollution control is presented, which proves that theoretically it is more costly to society to satisfy air quality standards through emission standards than with selectiv abatement. Causes and effects of air pollution are reviewed, a cost model for air pollution abatement is considered, and the empirical research on the cost of air pollution control is included. Forecasting with selective abatement is suggested to be the least costly approach to air pollution control. More research should be conducted to develop extensive meteorological diffusion models and better meteorological forecasting models.

11028 APTIC NO. 28594

Kapp, W. William

ENVIRONMENTAL DISRUPTION AND SOCIAL COSTS: A CHALLENGE TO ECONOMICS.

Kyklos (Intern. Z. Sozialwiss.), vol. 23:833-848, 1970. 21 refs. (Presented at the International Symposium on Environmental Disruption in the Modern World: A challenge to Social Scientists, Tokyo, Japan, March 8-14, 1970.)

Consideration is given to the almost catastrophic rates of environmental disruption (as evidenced by rising rates of water and air pollution, mounting rates of chronic bronchitis and other diseases, increasing levels of noise and odor, and higher frequencies of accidents). The disruption and the magnitude of the social costs are the outcome of an interaction of several complex systems, economic, physical, meteorological, and biological an interaction that is much more complex than any of the various systems which conventional social disciplines have ever studied. The challenge to economics is that environmental disruption defies treatment in terms of traditional economic concepts such as Gross National Product. The answer will be found only when economics abandons its concentration on purely formal definitions of utility, efficiency, and optimality unrelated to actual levels of satisfaction of human needs and requirements.

11029 APTIC NO. 28674

Electricite de France, Service de la Production Termique

REPORT OF ACTIVITIES, 1969; APPENDIX IX. PREVENTION OF INDUSTRIAL DAMAGE. COMMERCIALIZATION OF SOLID RESIDUE OF COMBUSTION.

(Rapport d'activite 1969; Annexe IX. Prevention des nuisances d'exploitation). Text in French. July 15, 1970, 95p.

This report by the French Electric Company encompasses the subjects of air pollution, water pollution and noise pollution. The largest section is devoted to air pollution; the material is mostly tabular in nature. The subjects covered include prevention measures currently being used (smoke stacks, dust separators), fly ash, sulfur emissions, radioactive emissions from nuclear plants, studies of air pollution prevention, meteorological measurement surveys in the lower atmosphere, and a comparison with other air pollution sources in France. Data is given on the types of dust separators currently being used, and on the testing and inspection of such separators in various areas of the country. Sulfur emissions are still an important problem. Of the radioactive emissions of nuclear power plants 99.9% of the radioactive pollution is attributed to Argon-41. The section on air pollution studies includes a bibliography of five published reports. The number, type, and location of studies, the location of special laboratories, and the organizations that have participated in study projects are provided. The following figures are given on the contribution of various pollution sources: the electric company uses 16.8% of the solid fuel used in all of France and 57.3% of the solid fuel used in the Paris area, in its power plants. The electric company power plants contribute 4.1% of the dust pollution in all of France and 25.2% in the Paris area. The electric power plants burning liquid fuels accounted for 10.3% of the sulfur emissions in all of France and for 9.4% in the Paris metropolitan area, in 1968. These figures represent an improvement over the figures for 1967. Tabular data lists the tonnage and monetary value of solid residue of combustion sold commercially during the years 1961 through 1969.

STANDARDS AND CRITERIA

11030 APTIC NO. 27912

Oshio, Toshiki

ON THE ENVIRONMENTAL STANDARDS FOR SULFUR OXIDES.

(Iosankabutsu ni kakawaru kankyokijun ni tsuite). Text in Japanese. Sangyo Kankyo Kogaku (Ind. Environ. Eng.), vol. 65/66:3-18, July 1969.

The determination of the Environmental Standards for Sulfur Oxides was based on the following guidelines. First, the main goal is the protection of human health, but with consideration of the harmony of the conservation of the living environment with healthy growth of the economy. Secondly, the standards are to be established as criteria for the administration of air pollution control. Thirdly, the concentration of sulfur oxides must be maintained below certain levels, except under very adverse meteorological conditions. The standards concerning human health were finally settled with respect to the following: the number of hours for which the hourly average is below 0.2 ppm must be maintained over 99% of the total number of hours per year; the number of days for which the hourly 24-hour average value is below 0.05 ppm must be maintained for more than 75% of the total number of days per year; the number of hours for which the hourly average is below 0.1 ppm must be maintained over 88% of the total number of hours per year; and the annual average of the hourly values must be below 0.05 ppm. For any location, the number of days for which emergency measures are required by Air Pollution Control Law must not be over 3% of the total number of days per year, and in addition should not continue for more than three consecutive days. The above conditions must all be satisfied throughout the year. Various data and diagrams are presented in order to explain the mechanisms of the standards.

11031 APTIC NO. 28079

Yamaki, Naoomi

ON AUTOMOTIVE EMISSION GAS COUNTERMEASURES.

(Jidosha haishutsugasu taisaku ni tsuite). Text in Japanese. Preprint, Society of Electro-Chemistry, Tokyo (Japan), Kanto Div., 21p., 1971. 14 refs. (Presented at the Seminar on Air Pollution, Tokyo, Japan, Feb. 3-4, 1971, Paper 7.)

Classes of automotive emissions are discussed together with Japanese emission criteria, and devices for purifying the emission gases. The three major sources of air-polluting automobile emissions are the engine exhaust, the crankcase, and the fuel system. Contaminants contained in engine exhaust include carbon monoxide, hydrocarbons, nitrogen carbide (sic), sulfide, lead compounds, and soot. Hydrocarbon is also present in crankcase emissions and fuel tank and carburetor evaporation losses. The Automotive Emission Gas Control Criteria specify that the following reductions must be achieved by April 1975: a carbon monoxide, 7 g/km; hydrocarbons, 0.3 g/km; nitrogen oxides, 0.6 g/km; granular substances, 0.06 g/km; and evaporation losses, 6 g/day or less. Crankcase emissions are to be controlled by a device whose installation became compulsory effective September 1970. These criteria are as stringent as the 1975 U. S. regulations. Two basic approaches to purifying engine exhaust gase are engine modification and exhaust manifold air jet systems. To meet the 1975 criteria, the former will have to be combined with other control measures. Alternative control approaches are represented by exhaust manifold reactors, catalytic converters, and the use of nonleaded gasoline.

11032 APTIC NO. 28120

Juda, Jan and Stanislaw Chrosciel

CLASSIFICATION COEFFICIENT OF FILTER MATERIALS.

(Vergleichskoeffizient von Filtrationsmaterialien). Text in German Staub, Reinhaltung Luft, 30(12):522-526, Dec. 1970.

Presently about 20 different tests are used to evaluate filter materials. Test results obtained by the various methods are not comparable as demonstrated on the example of the AFI method and of the BS 2831 test. Filters can be compared only when they are evaluated by the same test. The parameters which are of importance in the classification of fiber filters, namely the initial separation efficiency and its increase during operation, the aerodynamic properties of a filter expressed by the relationship between dynamic pressure and static pressure drop, and the dust collecting capacity of the filter constitute the three factors entering into definition of a quality coefficient permitting a comparison between fiber filters of different structure and filtration properties. The quality coefficient in its mathematical form was applied to 10 filters and the proposed method was considerably more accurate than hitherto used classification criteria.

11033 APTIC NO. 28419

CRITERIA TO PREVENT AND CONTROL AIR POLLUTION FROM FEDERALLY ASSISTED MASS TRANSPORTATION PROJECTS.

U. S. Gov. Res. Develop. Repts., 7p., Feb. 1965.

Criteria are presented for facilities and equipment designed to control air pollution from buses, locomotives, ferries, heating and power plants, incinerators, and liquid fuel storage and handling facilities. The criteria apply to facilities and equipment to be constructed or remodeled with federal assistance, as provided for in the Urban Mass Transportation Act of 1964.

11034 APTIC NO. 28436

Bascom, R. C. and G. C. Hass

A STATUS REPORT ON THE DEVELOPMENT OF THE 1973 CALIFORNIA DIESEL EMISSIONS STANDARDS.

Preprint, Society of Automotive Engineers, Inc., New York, 14p., 1970. 18 refs. (Presented at the Society of Automotive Engineers, National West Coast Meeting, Los Angeles, Calif., Aug. 24-27, 1970, Paper 700671.)

The cooperative effort to develop the test procedures and measurement methods needed before adoption of emission standards for unburned hydrocarbons, carbon monoxide, and nitrogen oxides fro diesel engines is summarized. Emphasis is placed on the developmen of the 13-mode test cycle and on the philosophy and reasoning behin the use of new or different procedures such as brake specific emissions and the expression of oxides of nitrogen as nitric oxide. The brake specific emissions concept started when it was noted that a straight line resulted when the mass flow of oxides of nitrogen was plotted against brake horsepower for a given engine, and that the slope of this line differed with engine type. An unapproved working draft of the Test Procedure is included. Test work on three engines is being carried out to determine the correlation between engine dynamometer and chassis dynamometer test procedures. (Author abstract modified)

11035 APTIC NO. 28438

Air Pollution Control Office, Research Triangle Park, N. C., Div. of Control Agency Development

GUIDELINES FOR LIMITATION OF CONTACT SULFURIC ACID PLANT EMISSIONS. APCD Pub-APTD-0602, 14p., Jan. 1971. 10 refs.

NTIS: PB 197318

Sulfur dioxide, sulfur trioxide, and acid mist in the absorber tail gas are the principal air pollutants emitted from a contact sulfuric acid plant. All three present potential health hazards. Careful application of currently available technology can reduce the SO2 emissions to 6.5 lb/ton of acid produced, but pilot-scale studies of new control processes indicate that SO2 emission levels of 2.0 lb/ton of acid produced are obtainable. Appropriate equipment is available for reducing acid mist levels to 0.5 lb/ton of acid produced. Efficient absorber operation can limit SO3 levels to 0.2 lb/ton of acid produced. These levels are suggested as guidelines for state and local regulatory agencies in the preparation of emission control regulations for contact sulfuric acid plants.

11036 APTIC NO. 28466

Lebedev, Yu. D., M. K. Nedogibchenko, and L. F. Glebova

CERTAIN RESULTS AND IMMEDIATE PROBLEMS OF HYGIENE SCIENCE AND SANITARY PRACTICE IN THE AREA OF PROTECTING CITY AIR.

(Nekotoryye itogi i blizhayshiye zadachi gigiyenicheskoy nayki i sanitarnoy praktiki v oblasti okhrany atmosfernogo vozdukha gorodov). Text in Russian. Gigiena i Sanit., 21(11):3-8, 1956.

Maximum allowable concentrations have been established for a number of air pollutants as follows (single and daily-average values, respectively, mg/cu m): sulfur dioxide, 0.50, 0.15; chlorine, 0.10, 0.03; hydrogen sulfide, 0.03, 0.01; carbon disulfide, 0.50, 0.15; carbon monoxide, 6.0, 2.0; nitrogen oxides, 0.50, 0.15; non-toxic dust, 0.50, 0.15; soot, 0.15, 0.05; phosphorus pentoxide, 0.15, 0.05; manganese and manganese compounds, 0.03, 0.01; fluorine compounds, 0.03, 0.01; sulfuric acid, 0.30, 0.10; phenol, 0.30, 0.10; arsenic (inorganic compounds other than arsine), 0.003; lead and lead compounds (other than tetraethyl lead), –, 0.0007; and metallic mercury, –, 0.0003. Major administrative and technical problems associated with air pollution control in 1956 are reviewed.

11037 APTIC NO. 28664

HYDROCARBONS AND AIR POLLUTION: AN ANNOTATED BIBLIOGRAPHY. PART II.

National Air Pollution Control Administration, Raleigh, N. C., Office of Technical Information and Publications, Pub. AP-75: 583-1182, Oct. 1970.

NTIS: PB-197165

This bibliography represents an effort to collect, condense, and organize the literature on hydrocarbons in relation to air pollution. Certain hydrocarbon derivatives may have direct carcinogenic effects on lung tissue. One of the major concerns wit hydrocarbons as pollutants, however, is in the indirect effects attributed to their role in the formation of smog through photochemical reactions with other substances. In the present volume, the effects of hydrocarbons are considered on human health, plants and livestock, materials, and economic factors. Air quality measurements are indicated, as well as legal and administrative factors, and standards and criteria.

11038 APTIC NO. 28688

Martland, L.

EMISSIONS FROM DIESEL MOTOR VEHICLES, PART 2.

British Technical Council of the Motor and Petroleum Industries (England), Inst. of Petroleum, London (England), and Inst. of Mechanical Engineers, London (England), Automobile Div., Proc. Symp. Motor Vehicle Air Pollution Control, London, England, 1968. (Nov. 25-26, Paper NO 1) vol. 183, Part 3E:151, 1968-1969.

In traffic, the opacity of diesel smoke constitutes a well-recognized difficulty by limiting visibility and, consequently, driver control. In this state, diesel exhaust smell is objectionable and deposition of particles can be unsightly. The two control means for limiting diesel emissions are discussed with emphasis on the need to develop realistic measurement procedures common to Europe. The control means are as follows: Type test acceptance of exhaust emission levels from diesel-engine vehicles of all types and of engines for use in road vehicles and 'in-service' test inspection of exhaust emission levels from diesel-engine vehicles of all types.

11039 APTIC NO. 28777

Iijima, Teiichi, Mutsuhiro Fujita, and Tomoko Tanaka

INVESTIGATION OF ORIGINAL UNIT OF PUBLIC HEALTH.

(Kogai gentani chosa). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):192, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

With the goal of improving statistical methods of investigating public nuisance problems, an attempt was made to develop an 'original unit' for smoke and waste water discharge, which eventually can be used for control measures, effective land use, and installation of related equipment. As denominators of the original unit, 1) annual shipment volume, 2) total annual production of important goods, and 3) the total use of the main factors of production are conceivable. Denominators can be: 1) total annual use of different types of fuel, 2) hourly smoke emissions, 3) smoke emission per stack, 4) rate of water use, 5) daily water discharge rate, 6) water quality at the discharge port, 7) waste water treatment method, and 8)location of discharge. Other business data were also checked for consistency. The investigation encompassed 138 types of industries, 3614 plants with at least 100 employees. While the total response rate was only 47%, 100% responses were obtained from 11 types of industries.

11040 *APTIC NO. 28778*

Hayashi, Hideo, Sataro Iwasaki, Toshio Wakai, Toshio Hasegawa, Shigehiro Hirao, and Minoru Fukurotani

CALCULATION OF EMISSION STANDARDS PROVIDED IN AIR POLLUTION CONTROL LAW BY A DESK COMPUTER.

(Taiki osen boshiho no haishutsukijin to no keisan ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):181, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

The concentration of sulfur oxides at the discharge port of a stack depends on a constant that is determined for various areas and the square of the effective stack height. The calculation of effective stack height further involves the true height of the stack, amount of waste gas at 15 C and the emission speed and temperature of the waste gas. To calculate sulfur oxides concentration for application to the environmental standards, various methods such as nomograms and tables have been developed. However, a desk calculator with magentic memory cards can be used to speed up the calculation, and still obtain accurate results. Another advantage is that raw data instead of reported data can be fed in directly. With eight input data, 16 output data can be obtained. The print-out can be pasted directly on the form listing such items as fuel consumption, specific weight of fuel, waste gas emission quantity and SO2 emission concentration.

11041 APTIC NO. 28788

Kohayakawa, Takashi

CO STANDARD AND ITS CONTROL.

(CO kakyokijun to CO kisei ni kansuru ichikosatsu). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):248, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

In Japan, where the concentration of carbon monoxide depends largely on the number of automobiles operating in the neighborhood of measurement locations, the basic Los Angeles-type approach to controlling CO on the basis of projected future consumption of gasoline would not be very meaningful. To compare the environmental standard values of CO and the actual measurement values in a meaningful manner, it is not sufficient to count the number of days for which the environmental standards are exceeded. Rather, a histogram must be constructed that indicates the actual CO concentrations (8-hr or 24-hr averages) in the abscissa and the number of days of occurrence of the corresponding concentrations) along the ordinate. Also, the limiting volume of traffic that influences the histogram for a particular location must be considered. It is already known that CO concentrations decreases with distance from the traffic path. In addition, CO emission regulations that take into account the modes of driving at various locations are desirable.

LEGAL AND ADMINISTRATIVE

11042 APTIC NO. 27890

Gerhardt, Paul H.

INCENTIVES TO AIR POLLUTION CONTROL.

Law Contemp. Probl., 33(2): 358-368, Spring 1968. 31 refs.

In the debate over air pollution between economists, legislators, administrators, and businessmen, adversaries of pollution abatement programs have cloaked the substantive issues in a shroud of public rhetoric. Although technical experts testify that air pollution is constantly imposing economic costs in terms of material damage and health aspects, no one is willing to assume the burden of eliminating the damaging pollutants. The economist sees the problem as a classic case of an external diseconomy. No producer has an incentive to eliminate his pollution entirely; his incentive is limited to the elimination of that part which adversely affects his own operation. Examination of alternatives suggests that there are two basic types of incentives that may be used to encourage polluters to reduce their emissions: economic incentives and enforcement of regulations. The economic incentives involve the public's sharing the costs of control in a rather direct way. Tax credits, award payments, emission charges, or combinations of these would stimulate reductions in emissions. The pros and cons of these methods are discussed. The alternative to economic incentives is regulations with fines and penalties to enforce them. Present trends the U.S. indicate greater use of regulations than of direct cost-sharing incentives.

11043 APTIC NO. 27897

Hamburg, Fredric C.

SOME BASIC CONSIDERATIONS IN THE DESIGN OF AN AIR POLLUTION MONITORING SYSTEM.

Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 18p., 1970. 6 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 63rd, St. Louis, Mo., June 14-18, 1970, Paper 70-100.)

Quantified air quality and meteorological information provided by an air pollution monitoring system must be geared to the legally prescribed functions of the control agency. The network should be closely interphased with data systems for emission inventory, registration and permits, violations and complaints, fuel use, emission reduction plans, land use, demographic projections, and urban planning. Compatibility with neighboring and statewide or regionwide data systems is essential for coordination of effort, especially under episode conditions. The network should be planned on three levels--static, semi-automatic, and fully automatic--to provide monthly, daily, and up-to-the-minute measurements. Experience shows that far more data tend to be generated than can be analyzed, assimilated, and utilized, and an order of priority for functions should be determined. A systems engineering approach to planning will ascertain that preliminary requirements are critically scrutinized, and only genuine requirements that meet the test of constraints (natural environment, economic, legal, social, political constraints, and manpower resources) will be translated into performance specifications. (Author abstract modified)

11044 APTIC NO. 27909

Yokohama Municipal Office (Japan), Public Nuisance Control Center

REPORT ON INVESTIGATION OF PUBLIC NUISANCE CONTROL AT ESTABLISHED INDUSTRIAL AREAS IN YOKOHAMA.

(Yokohama-shi kisetsu kogyochiiki kogai taisakuchosa hokoku). Text in Japanese. 101p., Feb. 1970.

An investigation of public nuisance control measures at established industrial areas in Yokohama is presented. The aim of the investigation was to uncover the actual condition of pollution sources and their pollution control facilities in Tsurumi-Kanagawa Coastal Industrial Complex, and to obtain basic material and data on the area toward public nuisance control guidance. The content of the report is generally divided into construction, air pollution, and waste water and wastes, but it is essentially concerned with the comprehensive recommendations on the present and future existence of the area, based on the questionnaire survey of 35 factories and actual on-site investigations. In conjunction with the investigation, 'Yokohama method' is supported as a basic idea behind public nuisance control measure, where comprehensive utilization of science and technology, publication of related material and data centered on that utilization, and strengthening of the cooperation between related administrative and research organizations constitute the main theme.

11045 APTIC NO. 27963

USA: AIR POLLUTION CONTROL EQUIPMENT AND APPARATUS.

(USA: Geraete und Apparaturen zur Reinhaltung der Luft). Text in German. Wasser, Luft Betrieb, 15(2):45-51, 1971.

Exhibit including pictures and models of dust and pollution control equipment, of equipment for the handling of solid waste, of accessories for such equipment and of numerous emission recording devices exhibited by 30 American manufacturers at the American Commercial Center in Frankfurt/M. are described. Among the exhibits was equipment for the removal of SO2 and SO3 from flue gases; fume incinerators for complete thermal combustion of organic pollutants; washable all-aluminum filters for the control of aerosols, fat, fogs, and pollen; polyethylene filters; cyclones for the separation of water and oil droplets and of solid particles; and industrial vacuum cleaners. American and German air pollution specialists spoke at the Fair on the following topics: contemporary processes and equipment for the control of dusts, gases and aerosols; current American legislation concerning air pollution; research conducted by the National Air Pollution Control Administration; endeavors of the American refineries and power industry to reduce SO2 and SO3 emission; remote pollution control from aircraft and satellites; the government pollution control network; and the training of pollution experts at universities.

11046 APTIC NO. 28014

LEGAL NOTE ... LIABILITY FOR AIR POLLUTION.

Public Health Rept. (U. S.), 74(2):104, Feb. 1959. 1 ref.

In a suit for damages resulting from fluoride poisoning allegedly caused by the defendant's aluminum reduction plant, the plaintiff was unable to specify any particular acts of negligence by the defendant and was compelled to rely on the legal doctrine of 'res ipsa loquitur' (the thing speaks for itself). This doctrine, according to which the facts of the occurrence warrant the inference of negligence, was held applicable by a court of appeals. The defendant's evidence of reasonable care was considered insufficient to require finding as a matter of law that inference of negligence had been overcome.

11047 APTIC NO. 28048

City of Pittsburgh, Pa., Council

PITTSBURGH SMOKE ORDINANCE.

Ordinance No. 344, Bill No. 3093, 23p., July 7, 1941.

The production or emission of dense smoke (equal to or greater than a density of No. 2 on the Ringelmann Chart, U. S. Bureau of Mines) is prohibited according to the Pittsburgh Smoke Ordinance. The escape of soot, cinders, noxious acids, fumes, gases, or fly ash from any stack into the open air, of such quantity as to cause injury or detriment to the public is prohibited. Sale, use, or consumption of solid fuel which does not meet standards for smokeless fuel (volatile content, 20% or less on a dry basis) is prohibited. A Bureau of Smoke Prevention is established. New fuel burning plants, or reconstructed, additional, or repaired plants must have their design approved by the Superintendent of the Bureau of Smoke Prevention. All sales and purchases of refuse, fuel-burning equipment, or devices for producing heat or power, which are required to be connected to a vent or stack must be reported in writing to the Superintendent of Smoke Prevention. In certain cases, smoke indicators or other approved methods of observing smoke from the boiler or furnace are required. Fees are established for examination of plans and issuance of permits, inspection of furnaces or other fuel-burning equipment or devices, and issuance of certificates of operation. An Appeal Board is established, and fines and penalties for the violation of the provisions of this Ordinance are provided.

11048 APTIC NO. 28066

ENVIRONMENTAL PROTECTION SETS LIMITS ON THE METAL INDUSTRY.

(Umweltschutz setzt Grenzen fuer die Metallwirtschaft). Text in German. Metall., 25(1):99, Jan. 1971.

The project of a South African company to create a copper mine in the Austrian Tyrol was thwarted by the local government in cooperation with Tyrolean and Bavarian groups for combating air pollution. In the summer of 1969, the Hibino Metal Industry Company in Maibara ceased operation of its copper plant because of air pollution. The lead industry will be influenced by the limitation of the lead content in gasoline to 0.4 g/liter beginning with 1972. By October 1975, all refineries must have switched to production of low lead gasoline, to reduce the 7000 tons of lead emitted annually by automobiles.

11049 APTIC NO. 28082

Gousset, P.

FRENCH LEGISLATION ON ATMOSPHERIC POLLUTION.

(Reglementation en matiere de pollution atmospherique). Text in French. Ann. Mines (Paris), no. 11:85-92, Nov. 1970.

There is specific French legislation relating to each of the three main sources of pollution: domestic heating, industry, and automotive traffic. A law passed August 2, 1961 reinforces existin legislation while supplementing it and coordinating its application. The new law calls for a more careful classification of industrial plants, making it applicable to other problems besides those of air pollution; gives the French government greater powers in the regulation of emissions, the construction of new buildings, and the opening of new plants, where these are in violation of the plant classification laws; gives the government the right to regulate the use of fuels and the manufacture of equipment that can be a source of pollution; grants emergency powers to local magistrates to take action against emissions of pollutants considered dangerous to public health; provides for the establishment of specially protected zones, in which more intense control is exercised over plants that emit pollutants and over the concentration of such pollutants in the air. The relationship of the administrative and judicial of government is discussed in relation to the enforcement of the new, tougher policies.

11050 *APTIC NO. 28099*

Kohayakawa, Takashi

CONTROL OF ENVIRONMENT PRESENT AND FUTURE.

(Kogai taisaku no genjo to shorai). Text in Japanese. Jidosha Gijutsu (J. Soc. Automot. Engrs. Japan), 25(1):46-55, Jan. 1971. 3 refs.

Of all environmental contaminants, automobile exhaust emissions mus take precedence for control measures. Plans for management of the environment must consider development of the following: an analyze for pollutants such as oxidants, measuring instruments and methods for control of waste particles, methods to determine the activity and vaporization of hydrocarbons, an analyzer for nitrogen oxides, equipment and methods for the analysis of heavy metal compounds such as lead, and methods to determine offensive odors. Altering the composition of gasoline components is one method for controllin carbon monoxide and hydrocarbon emissions which result during engin operation. However, the resulting mixture must not be such as to originate new problems. If lead is limited to 1/5th the amount now present in gasoline, it may fulfill this purpose without exceeding the provisional air environmental standard. Carbon monoxide contamination is discussed, as traffic areas indicate extremely high CO concentrations. The relation between secondary products of air pollution and primary wastes is important regarding the future control of hydrocarbons, nitrogen oxides, and sulfur oxides. Photochemical smog in Tokyo differs from that in Los Angeles, as automobile exhaust does not appear to influence its production.

11051 APTIC NO. 28107

APEX–A TRAINING EXERCISE FOR AIR POLLUTION CONTROL OFFICERS.

J. Air Pollution Control Assoc., 21(3):146-148, March 1971.

The Air Pollution Exercise (APEX) is intended to provide dynamic operational gaming simulation for the University of Southern California's Air Pollution Control Institute training program. Its major aim is to assist students in understanding and appreciating the complexities of the overall city and metropolitan environment, the problems and perspectives of other decision makers in that environment, and the potentials and limitations of an air pollution control program that must compete with many other problems and issues for the attention of those decision makers, as well as for scarce resources. The Apex environment, roles, and game progression are described.

11052 APTIC NO. 28174

Osaka Prefectural Council on Countermeasures for Pollutions (Japan), Subcommittee on Amendment of Prefectural Ordinance

REPORT ON THE AMENDMENT OF OSAKA PREFECTURAL ORDINANCE ON PREVENTIO OF POLLUTIONS.

(Osakafu kogai boshi jorei no kaisei ni tsuite (hokoku)). Text in Japanese. 9p., Jan. 25, 1971.

It is proposed to amend the Osaka Prefectural Ordinance of 1969 which concerns the prevention of pollution by (1) deleting the phrase 'in harmony with the sound development of industry' and thus giving priority to human health, (2) adding soil pollution and subsidence to the list of pollution types, (3) clarifying the roles of business, governments and residents in the prevention of pollution, (4) stipulating that the Prefecture will determine 'environmental standards as administrative target figures, (5) clarifying and expanding the section on preventive measures, and (6 including measures to be taken when acute pollution episodes appear imminent.

11053 APTIC NO. 28177

Ruckelshaus, William D.

A BREATH OF FRESH AIR.

J. Air Pollution Control Assoc., 21(2): 52-53, Feb. 1971.

The scope and goals of the Environmental Protection Agency (formerly NAPCA) are discussed. The Agency has the combined responsibility for research, standard-setting, monitoring, and enforcement with regard to all contaminants threatening man and nature. It exercises these responsibilities as an independent agency and thus will be an advocate for the environment whenever political or industrial decisions affecting the future of air and water quality are made. In its commitment to clean air, the Agency has established national standards for automotive exhaust, will foster research on the development of a nonpolluting automobile, and is calling for the application of air quality standards throughout the entire nation.

11054 APTIC NO. 28191

Keitz, Edwin L. and T. R. Mongan

ANALYSIS OF REQUIREMENTS FOR AIR QUALITY MONITORING NETWORKS.

Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 25p., 1970. (Presented at the Air Pollution Control Association, Annual Meeting, 63rd, St. Louis, Mo., June 14-18, 1970, Paper 70-102.)

The need for local, regional, or national air quality monitoring networks was analyzed. Additionally, the need for operating such networks on a rapid response basis was studied. Information was obtained by interviewing personnel from eight National Air Pollution Control Administration offices and 13 local or regional agencies. Operational needs exist for air quality monitoring networks on a local and regional scale. Networks having rapid response time may be justified in a few cases. Networks having delayed response times are readily justifiable and may be necessitated by federal and local legislation. In all cases, response time can be justified only on the basis of the time scale for actions taken based on data. Operational needs also exist for air quality data gathering on a national scale on a delayed respons basis. These needs suggest the operation of a national air pollution data bank. Presently, no operational needs exist for any air quality data gathering with rapid response times on a national scale. Justification for any type of air quality monitoring network, whether it be local, regional or national, rapid or delayed response, must be based on the use made of the resulting data. This use must have a completely justified correspondence to the characteristics of the data provided by the air quality monitoring network. (Author abstract modified)

11055 APTIC NO. 28259

Sander, O. A., Arthur J. Vorwald, George W. Wright, James L. Hill, and William C. Hartman

THE LUNGS, THE ENVIRONMENT, AND COMPENSATION.

Arch. Environ. Health, vol. 4:362-378, March 1962. (Presented at the Industrial Hygiene Foundation, Annual Meeting, 26th, Pittsburgh, Pa., Oct. 25, 1961.)

A panel discussion of the general environment, air pollution, personal air pollution due to smoking, and environmental factors at the place of work is presented. In the general environment and the specific occupational environment, the inhaled air is not all oxygen, carbon dioxide, and nitrogen. Samples of the general atmosphere, especially from urban and highly industrialized communities, disclose a complex variety of organic and inorganic substances. The lung poses a variety of complex problems about which there is still much to be learned from its anatomical, physiological, and biochemical aspects in health and disease at different ages. Problems of compensation could be resolved more judiciously if greater attention were given to factual evidence concerning the environment, its specific effects on the exposed individual, the definitive nature of his response, and the specific resultant impairment of abilities. The problems involved in diagnosing and determining an occupational disease were also discussed. Specific attention was given to tuberculosis and silicosis.

11056 APTIC NO. 28343

Katayama, Toranosuke

ADMINISTRATIVE MEASURES TO BE TAKEN BY REGIONAL PUBLIC ENTITIES FOR CONTROL OF ENVIRONMENTAL DISRUPTION.

(Chiho kokyodantai no kogai gyosei no arikata). Text in Japanese. Preprint, Japan Environmental Hygiene Center, Tokyo (Japan), 7p., 1970. (Presented at the Japan Environ. Hyg. Center Public Nuisance Seminar, 1970, Part 6.)

Japanese prefectural ordinances, issued by a number of local governments, to check environmental disruption and their overall trends are discussed. Earlier environmental disruption control ordinances issued by prefectural governments date back to 1949, before the promulgation in 1962 of the government's 'Water Quality Preservation Law.' As of August 1970, 44 prefectures have formulated such an ordinance and a few remaining prefectures will have enacted it by the end of 1970. All but Tokyo, Nagano, and Hyogo have a clause known as the consonant with economical development clause. It is also contained in the National Environmental Disruption Countermeasure Basic Law. In all 44 prefectures, air pollution, water pollution, noise, offensive odors, and vibrations are subject to legal restraints. Responsibility for preventing environmental disruption is in most cases, stipulated separately for prefectoral governments, municipal offices, business enterprises, and local inhabitants. A majority of the prefectures have provisions under which particular facilities or areas can be designated for application of special control measures. The relationship between the environmental disruption control regulations enacted by the central government and those by local governments is briefly discussed. Also reviewed is an environmental disruption prevention agreement between a regional public entity and an individual enterprise. The agreement aims at promoting a cooperative attitude and voluntary actions on the part of the enterprises. More recently, similar agreements are being concluded between individual enterprises and local groups of inhabitants.

11057 APTIC NO. 28345

Yamada, Tsuyoshi and Kenichi Hamada

JAPAN-U. S. CONFERENCE ON ENVIRONMENTAL POLLUTION.

(Kogai ni kansuru nichibei kaigi). Text in Japanese. Kogai (Hakua Shobo) (Pollution Control), 5(6):318-338, Nov. 1970.

President Nixon and Premier Sato proposed to strengthen cooperation on environmental pollution on Oct. 4, 1970. A preliminary conference was held Oct. 8th and 9th, and a ministerial level conference on Oct. 14th. The agenda for the preliminary conference (including committee meetings) was as follows: (1) Urgent problems concerning air and water pollution; (2) Preventive measures; (3) Research and development; (4) Fields to be emphasized in the cooperation program concerning air or water pollution and their ranking; (5) Promotion of cooperation between the two countries concerning pollution countermeasures; and (6) Relationship between multi-national cooperation and bilateral cooperation between Japan and the U. S. The discussion took place at a general meeting, an air pollution meeting, and a water quality meeting. Reports of these meetings were made to the plenary session and were confirmed. The ministerial conference took place on the afternoon of Oct. 14th, attended by Mr. Yamanaka, State Minister in charge of pollution, and Mr. Trayn, chairman of the Advisory Committee on environmental problems to the President. A paper reviewing problems concerning air and water pollution was submitted to the plenary session by Japan. The prevention of air pollution from sulfur oxides and nitrogen oxides from fixed pollution source, desulfurization of heavy oil, and desulfurization of smoke emitted, from factories, were discussed. The big project of the Ministry of International Trade and Industry was the activated managanese oxide method and the desulfurization of smoke by activated charcoal. The treatment of NO, the measurement of sulfur and nitrogen oxides, automatic monitoring networks, methods of analysis the present condition of air pollution by cars, preventive measures prevention and measurement technologies, their effects on air pollution, the present situation and future outlook of air pollution, meteorology, pollution effects on plants, agricultural crops, and fruit trees, were all mentioned. A water quality report was also given.

11058 APTIC NO. 28348

Kanagawa Prefecture (Japan), Public Nuisance Prevention Center

ANNUAL REPORT OF KANAGAWA PREFECTURAL PUBLIC NUISANCE PREVENTION CENTER.

(Kanagawaken kogai senta nenpo). Text in Japanese. 102p., 1968,

The history of the Kanagawa Prefecture Public Nuisance Prevention Center, its organization, the jurisdiction oj ½tection, administrative aspects and research budgets, are given. The activities of the Center for the year, dealing with complaints, diffusion activities (use of gas absorption equipment, exhaust gas tester), and those on air pollution (survey of air pollution in Tokyo-Yokohama industrial area, coastal area, survey of sulfur dioxide emissions from factories, analysis of fuel oil, survey of odor from factories designated as sources of public hazards, patrolling coastal areas. patrolling factories when air pollution becomes acute, and surveying the effects of air pollution on plants) and on water pollution survey of rivers, factories, seas, water control patrol, survey when pollution becomes acute), and business connected with noise (survey of noise from factories, vibration caused by factories, noise due to traffic, vibration due to traffic, survey on noise from construction work, and street noise) are described. The lecture meetings held under the auspices of the Center are given. The BOD continuous and automatic gauge, developed by the Center, is explained; the device also records pH.

11059 APTIC NO. 28349

Industrial Engineering Center (Japan)

DATA FOR THE SEMINAR ON INDUSTRIAL POLLUTIONS PREVENTION COUNTERMEASURES, NO. 1: PROBLEMS AND FUTURE TRENDS IN LEGISLA-

TION RELATED TO INDUSTRIAL POLLUTION PREVENTION.

(Sangyo kogai boshi taisaku semina shiryo, No. 1, sangyo kogai boshi kanren horei no mondaiten to kongo no doko). Text in Japanese. 12p., 1970 (?).

At the 64th Extraordinary Diet session, held from November to December, 1970, 14 laws including the partial amendment of Pollution Countermeasures Fundamental Law, the Air Pollution Prevention Law, and the Water Pollution Prevention Law were passed. With the exception of the law partially amending the Agricultural Chemicals Control Law, all laws were promulgated as of December 25, 1970. Although the Fundamental Law came into force immediately, most of the other laws will become effective six months later due to the time required to prepare ordinances, ministerial regulations, and public notices. A comparison between the old, the new legislation concerning water pollution is given in tabular form, and the scope of each news law is explained. In sections on 'objectives' of the Fundamental Law, Air Pollution Prevention Law, the Water Pollution Prevention Law, and the Noise Control Law, the phrase 'in harmony between living environment and sound level development of economy' is deleted. The system designating special areas for the control of air and water pollution is lifted; control is to be extended to all the areas and public waters in Japan. National minimum discharge standards are established. In the Fundamental Law, soil pollution was stipulated as the seventh typical pollution and a law on 'the prevention of soil pollution for agricultural use' was established. A drastic amendment of the old Cleaning Law was made and the new law on 'treatment and cleaning of wastes' was established. Besides sulfur oxides, soot and dust, chlorine, hydrofluoride, cadmium and lead are controlled under the Air Pollution Prevention Law, while heated and colored water discharge are controlled by the Water Pollution Prevention Law. The range of industry is extended from primary to tertiary. Responsibility of entrepreneurs is clarified in the Fundamental Law to mean that they are to take 'necessary measures to prevent pollution such as treatment of sooty smoke, filthy water, and wastes'. The law on the sharing of pollution-control expenses was established, in keeping with Article 22 of the Fundamental Law, which stipulates the responsibility of entrepreneurs to bear the burden of expenses. Some responsibilities and authority are entrusted by the national government to local autonomous bodies. The future problems are: steps to make adequate use of land, further improvement in enterprises to prevent pollution, establishment of Environmental Agency, financial assistance to local area, enterprises, legislation on odor, and promotion of technology.

11060 APTIC NO. 28355

Szwarcsztajn, Edward

POLAND--NORWAY.

Pulp Paper Int., 13(1):39, Jan. 1971.

Environmental regulations affecting the pulp and paper industry are being formulated in most countries. However, as indicated by the examples of Poland and Norway, these regulations vary greatly from country to country. In Poland, water intake for industrial use and waste disposal to a stream require special permission from water authorities. This permission determines the total load of individual pollutants as well as their concentrations the allowed quantity of water intake, and the appropriate disposal method. Maximum allowable concentrations of pollutants that can be discharged to air or water are strictly defined, and three classes of inland surface water purity have been established. In Norway, no less than six different ministries may be involved in the different aspects of pollution, and there is considerable overlapping of various laws. A 1940 law regulating the dumping of harmful materials in lakes and rivers has had few restrictive effects on water pollution. It is being replaced by a new law that also takes into account pollution of salt water and ground water. A 1961 air pollution law requires that new plants and industries obtain government permission to operate and apply the best available methods for smoke and odor reduction. The law has not yet been extended to cover emissions from older industries.

11061 APTIC NO. 28363

Osaka Prefecture (Japan), Bureau of Hygiene

FULL TEXT OF OSAKA PREFECTURAL POLLUTIONS PREVENTION REGULATIONS AND REGULATIONS ON THE ENFORCEMENT OF OSAKA PREFECTURAL REGULATIONS ON PREVENTION OF POLLUTIONS.

(Osakafu kogai boshi jorei, Osakafu kogai boshi jorei seko kisoku). Text in Japanese. 19p., 1970 (?).

Osaka Prefectural Regulations No. 35 on the prevention of pollution were used on October 17, 1969 and became effective April 1, 1970. The full text of the Regulation is given. Chapter topics are as follows: general rules (Articles 1-3); control of factories (Articles 4-15); control of special construction work (Articles 16-17); control of use of megaphones, etc. (Articles 18-21); sundry regulations (Articles 22-26); and penalties (Articles 27-30). Article 1 stipulates the objective of the Regulation to determine the necessary items concerning prevention of public hazards, besides the specific points provided for in Pollutions Countermeasure Fundamental Law (Law No. 132, 1967) to protect the health of the people of Osaka Prefecture and to maintain a living environment in a manner in harmony with the sound development of industry. Article 2, defining public hazards, mentions air and water pollutions, noise, vibration, and odor. Recording and reporting responsibilies of enterprises are stipulated. Appended to the regulation are a list of special facilities concerning sooty smoke, a list of special facilities concerning gas and dust, a list of special facilities concerning filthy water, a list of special facilities concerning noise, and a list of special equipment including some facilities which are omitted from the Regulations. The Osaka Prefectural Pollutions Prevention Regulation Enforcement Rule was issued on March 16, 1970, as Osaka Prefectural Pollutions Prefectural Rule No. 8, and was amended on July 3, 1970 by Osaka Prefectural Rule No. 65. Chapter topics are as follows: general rule (Articles 1 and 2); rules on factories (Articles 3-6); rules on special construction work (Articles 7-10); Rules on the us of megaphones (Articles 11-17); sundry rules (Articles. 18-20); and supplementary rules, stipulating necessary items in the enforcement of the Osaka Prefectural Pollutions Prevention Regulation, to become active from July 20, 1970. List 1 of the Appendix gives the standards on the control of noise generated by special construction work and List 2, items to be complied with in using megaphones.

11062 APTIC NO. 28389

Semling, Harold V., Jr.

WHAT TO EXPECT FROM EPA AND THE COURTS.

Chem 26, 7(3):30-36, March 1971.

Reasons are cited as to why the pulp and paper industry can expect increased activity in the environmental area in the next few months. First, the problem has been recognized, not just by the government regulators, administrators, and scientists, but by the general public. Second, the public is putting its money, its votes, and its style of life on the line. Third, Congress has passed a wide range of legal authorities and procedures, both in terms of regulation and financial assistance, which are either in existence or under intensive development. The assessment of chemical use, state and local activity, resource recovery, the 1970 Clean Air Act, water pollution, the Refuse Act of 1889, permits, industrial waste studies and inventories, rules on tax deductions, the Council on Environmental Quality, the Environmental Protection Agency, and the national Industrial Pollution Control Council are mentioned.

11063 APTIC NO. 28397

INSTANT PROGRAM BY THE GERMAN FEDERAL GOVERNMENT FOR THE PROTECTION OF THE ENVIRONMENT.

(Sofortprogramm der Bundesregierung fuer den Umweltschutz). Text in German. Staedtehygiene (Uelzen/Hamburg), 22(1):2-4, Jan. 1971.

On September 17, 1970, the West German Government issued a program for the immediate protection of the environment. The following measures are included in the program: (1) the Ministry of the Interior is ordered to draft a law for protection against emissions; to study the necessity of the creation of a Federal Institute for the protection of emissions; and to place orders for the development of measuring instruments for air pollutants as soon as the necessary funds have been appropriated. In 12 heavily populated areas, 40 to 50 measuring stations shall be erected for the measurement of sulfur dioxide, carbon monoxide, and dust concentrations in the air. All measurements will be forwarded to a computer center. The Ministry of the Interior is to prepare a law limiting the lead content in gasolines to 0.4 g/l. This law is to become effective October 1, 1975.

11064 APTIC NO. 28420

Keitz, Edwin L.

DETERMINING DATA REQUIREMENTS AND PRIMARY PERFORMANCE CHARACTERISTICS FOR AIR QUALITY MONITORING NETWORKS.

Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 30p., 1970. 2 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 63rd, St. Louis, Mo., June 14-18, 1970, Paper 70-56.)

A set of guidelines is presented for the assistance of those preparing Air Pollution Control Office (formerly NAPCA) applications for grants for air quality monitoring networks. The information presented by an applicant should address such topics as the local meteorological characteristics of the region and their variations throughout the region; the seasonal variation of local meteorological characteristics; the variations of stability conditions, frequency of inversions, and mixing depth throughout the region; and the major differences between local characteristics and the macrometeorology. Applicants should identify general problems existing in an area and provide an evaluation of specific problems known or suspected to exist. In addition to identified local problems, information should be presented relevant to those pollutants considered of nationwide importance. These are sulfur dioxide, suspended particulates, carbonmonoxide, hydrocarbons, and total oxidants. The most critical point in the overall evaluation of grant applications is noted to pertain to technical data requirements for planned specific and nonspecific uses of the proposed network.

11065 APTIC NO. 28507

Tokyo Metropolitan Government (Japan)

TOKYO METROPOLITAN GOVERNMENT ORDINANCE ON PREVENTION OF PUBLIC HAZARDS.

(Tokyoto kogai boshi jorei). Text in Japanese. 48p., Nov. 1970.

The full text is given of the Tokyo Metropolitan Government ordinance No. 97, as amended November 5, 1970, and reissued as Tokyo Government Ordinance No. 156. The ordinance is organized as follows: General Rule, Definition (Art. 1); Responsibility of the Governor (Art. 2-11); Responsibility of entrepreneurs (Art. 12-15); Responsibility of citizens (Art. 16-17); Control of sources of public hazards, Factories (Art. 18-36); Designated workshops (Art. 37-45); Automobiles (Art. 46-49); Construction Work (Art. 49); On the use of megaphones (Art. 50-56); Wide Areal Air Conditioning Program (Art. 56); Measures on Emergencies, Areas of Air Pollution (Art. 56); Measures to be taken on emergencies of air pollution (Art. 56); Measures to be taken on emergencies of water pollution (Art. 56); Public Hazards Watch Committee (Art. 57); Sundry Regulations (Art. 58-60); Penalties (Art. 61-68); and Supplementary Rules, stipulating the date the Regulations become effective.

11066 APTIC NO. 28535

Golany, Jacob and Frank L. Cross

AIR POLLUTION CONTROL: AN IMPORTANT FACTOR IN INDUSTRIAL SITE SELECTION.

Consulting Eng., 36(4):67-69, April 1971.

To expedite the selection process and provide the industrial site analyst and facility planner with proper data and their interpretation as they relate to air quality standards, the establishment of an air quality information data bank is recommended. The data bank would be available to the various state, county, and local organizations promoting industrial development. In addition to the data bank, an engineer might be assigned to act as a liaison between the various public organizations and the industrial sector. Pertinent information in the data bank should include climatological data, meteorological data, state and local air quality standards, and enforcement procedures.

11067 APTIC NO. 28546

Mizuta, Haruo

COUNTERMEASURES FOR ENVIRONMENTAL DISRUPTION CAUSED BY INDUSTRY.

(Sangyo kogai taisaku). Text in Japanese. Preprint, Japan Environmental Hygiene Center, Tokyo, 4p., 1970. (Presented at Japan Environmental Hygiene Center Public Nuisance Seminar, 1970.

Environmental disruption consists of air pollution, water pollution, noise, vibration, offensive odors, and ground settling. Industry-caused environmental disruption is distinguished from urban environmental disruption which is caused by large populations and a highly modernized way of life. It includes air pollution from automobile exhaust gases and building heating systems, traffic noise, and water pollution from household sewage. A definition of secondary environmental disruption is also given. Laws and regulations govern emission of smoke, soot, and smut (enacted in 1962), preservation of water quality of water systems for public use, and control of effluents from factories (1958). Similar regulations for noise and ground settling are also given. Regulatory control to prevent noise and ground settling are not yet enforced due to a lack of effective measurement methods and control techniques, financial assistance which the government is providing to help combat environmental disruption is discussed.

11068 APTIC NO. 28579

Silva, Kenneth Charles and Benjamin Linsky

STRENGTHENING OR WEAKENING STATE AND LOCAL AIR POLLUTION CONTROL PROGRAMS: A STUDY BASED ON 'A HISTORY OF THE DEVELOPMENT OF THE FEDERAL AIR POLLUTION CONTROL PROGRAM IN RELATION TO STATE PROGRAMS, 1963-1967'.

Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 57p., 1970. 107 refs. (Presented at the Air Pollution Association, Annual Meeting, 63rd, St. Louis, Mo., June 14-18, 1970, Paper 70-88.)

The impact of Federal intervention into air pollution control is presented. The history and precedence of the various provisions of the Federal Air Pollution Control legislation are reviewed to determine the impact of individual aspects. The reason for the federal government's increased intervention into air pollution control is the result of either the state's unwillingness or inability to cope with the ever increasing problem with an real initiative. The significance of federal grants for air pollution control is that they not only provide money for state and local programs but that they also serve as a much needed leverage to be used by these programs against polluters. The Federal Air Pollution Control program does not appear to bring about any major alterations to the American political system if it is viewed as a growing pragmatic relationship between the federal government and the states. The factors which make the federal presence more conspicuous in the field of air pollution control include the magnitude of the problems, the size of the federal resources, the enlightenment of the political leaders, and the translation of dogmas into more current terms.

11069 APTIC NO. 28584

Mahler, E. A. J.

AIR POLLUTION.

Chem. Brit., 6(5):201-203, May 1970.

The legal basis for air-pollution control in the United Kingdom is the Alkali and Works Regulation Act of 1906. Originally covering only the chemical industry, the scope of the Act now includes a considerable portion of heavy nonchemical industry, including ironworks, steelworks, power stations, gasworks, coke ovens, and certain brick works. The main provision of the Act requires works to use the best practicable means to prevent the emission of any noxious or offensive gases and to render unavoidabl emissions harmless and inoffensive. The second requirement is usually met by discharging at such a height that ground-level concentrations are low. Routine inspections help insure compliance with the standards set by the Chief Alkali Inspector. Chemical plants scheduled under the Alkali Act cause little neighborhood air pollution. However, increasing production will require either development of new processes with an inherently lower proportional rate of emission or improvement of abatement measures.

11070 APTIC NO. 28590

Hettche, Hans Otto

REPORT ON LECTURE GROUP 1 (PLENARY ASSEMBLY) OF THE CONGRESS 'REINHALTUNG DER LUFT 1969.' Staub (English translation from German of: Staub, Reinhaltung Luft), 30(2):2-4, Feb. 1970.

NTIS: TT 70-50047/2

Means and aims of government supervision of emission sources and maintenance of clean air through regional planning are discussed. Emissions are supervised by inspecting a plant within and outside. Continuous measurements inside a plant are preferable to single measurements, but economically feasible only for large emittors. Up to now, emission supervision outside a plant has been carried out by subjective examination only. A new system introduced in an industrial area of Germany relies on 24-hr television observation and Lidar measurements by day. With regard to regional planning, residential areas should be separated from industrial areas by green belts. Moreover, regional and building planning must be coordinated by the same authority: only building planners can provide the regional planner with data on the expected increase in air pollution by projected new plants.

11071 APTIC NO. 28623

Mitsuo, Eiichi, Minoru Takeda, Takumi Watanabe, Toshio Odaira, Saburo Fukuoka, and Mitsuru Udagawa

AIR POLLUTION CONTROL CENTER OF TOKYO.

(Tokyo-to ni okeru taiki osen kontororu senta ni tsuite). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):221, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

The Tokyo Air Pollution Monitoring Network consists of wire-carried digital telemeter systems linking one central station and 13 observation stations. Data is processed and typed out automatically. The problem, however, is the lack of a mechanical-breakdown signaling device, which makes it impossible to differentiate between 0 and no data. Meteorological and carbon monoxide are typed out every 15 minutes, and the volume of typed material is difficult to manage. In the case of nitrogen dioxide, the mechanism is very delicate, and resetting of signals presents problems. The data that are typed out are indicated in large screens in public so that the people can be alerted to the condition of pollution. This is called the Dissemination Network. A problem in connection with this network is that mistakes in typing are repeated on the indicator. A Simultaneous Communication Network alerts cooperating industrial plants and other agencies by means of a wire-carried system, red lamps going on when alerts are issued. In addition, the control center is involved in the surveillance of emission sources.

11072 APTIC NO. 28644

Shidara, Masao

COUNTERMEASURES ON PREVENTION OF INDUSTRIAL POLLUTIONS. PART I. PREVENTION OF AIR POLLUTION.

(Sangyo kogai boshi taisaku--Taiki osen boshi). Text in Japanese. Kogyo Kanetsu (Ind. Heating), 7(4):17-32, July 1970.

Environmental pollutions was defined accompanying business activities, continuous human activities, and air, and water pollution. The Pollution Countermeasure Fundamental Law, its purpose, the responsibility of entrepreneurs and residents, the annual report to be made by the government to the Diet, environmental standards, rules on emission, and a pollution prevention plan were explained. The Air Pollution Prevention Law, its objectives, definition, designated areas, emission standards, a definition of facilities which emit soot and smoke, procedures to be taken at the time of accidents, steps to be taken by prefectural governors in time of emergency and allowable limits for automobile exhaust gases were described. Dust collecting equipment, control measures for harmful gases, and environmental standards for carbon monoxide were also given.

11073 APTIC NO. 28649

Matsuyama, Yukichi, Junichi Ueda, Sadaharu Hattori, Masaaki Kadoma, Katsuji Okazaki, Hiroshi Nakamura, Yasuo Mantani, and Nobuo Takeda

AIR POLLUTION SOURCES AND THEIR REGULATION IN KYOTO CITY.

(Kyoto-shi ni okeru baien hasseishisetsu no jittai to sono kisei). Text in Japanese. Taiki Osen Kenkyu (J. Japan Soc. Air Pollution), 5(1):222, 1970. (Proceedings of the Japan Society of Air Pollution, Annual Meeting, 11th, 1970.)

The control of the emission of sulfur oxides in smoke, as specified by the Air Pollution Control Law of 1968, depends linearly on a constant K, which has been set at 15.8 since February 1970. The relationship between K and C'max, the maximum ground-level concentration of smoke, is K equals 0.584C'max, although it is not very clear-cut. In order to see what the effect of the strengthening of emission regulations through the revision of the K-value would be, some analytical exercises were performed, based on the data obtained at emission sources in Kyoto. The values of K had a log-normal distribution. The plotting of the maximum ground-level concentration and sulfur oxides concentration versus percent change in K showed that since K has a log-normal distribution, in order for the revision of the K-value to be effective, the initial change must be very large. Compared to the effect of change of K on C'max, the effect on sulfur oxides concentration was very gradual.

11074 APTIC NO. 28672

Interstate Sanitation Commission, New York

SMOKE AND AIR POLLUTION. NEW YORK--NEW JERSEY.

95p., Feb. 1958. 64 refs.

Air pollution in the N. Y.-N. J. Metropolitan Area was studied in the summer and fall of 1957 by an Interstate Sanitation Commission with the participation of N. Y., N. J., and Conn. and various Federal agencies, by means of aerial reconnaissance and photography, tracer studies, air quality measurements, data collection and review from various published sources, community surveys, and public hearings. Subjects discussed include a summary of early investigations; recent air pollution surveys by local agencies; results of mass spectrometric analysis of condensates in five samples taken in the region; interrelationships between meteorology, climatology, and topography; results of tracer studies; air pollution effects on health, vegetation, and property; pollution in specific communities; and a study and evaluation of air pollution legislation in the communities. The study showed tha there is considerable transport across state boundaries in both directions, depending on wind and weather conditions. Besides being an irritating nuisance for millions of the inhabitants of the area, the economic losses from such effects as soiling and damage to vehicles and structural surfaces are enormous. Health may be adversely affected, especially in persons liable to asthma and certain lung impairments, and air pollution is suspected of being a factor in the increas in lung cancer and some forms of heart disease. Poor visibility from air pollution increases potential hazards at the area's airports, which are among the world's largest and busiest. Creation of an effective interstate control agency is recommended as the best means for dealing with these problems.

11075 APTIC NO. 28695

Schreiber, Michael

THE COSTS OF COMBATING AIR POLLUTION: THE INFLUENCE OF SOCIAL COSTS ON THE SELECTION OF AN INDUSTRIAL SITE.

(Kosten der Luftreinhaltung. Der Einfluss der social costs auf die industrielle Standortwahl). Text in German. Wasser, Luft und Betrieb, 15(3):105-109, 1971. 58 refs.

In West Germany, measures for the maintenance of clean air have been in effect for 14 years. By 1966 40 million Deutsche marks (DM) had been made available to combat air pollution. In 1967, the federal government appropriated 4.7 million DM, followed by an additional 23 million DM in 1968, in the form of credits for financing the purchase of control equipment. Three sectors are blamed for air pollution: traffic, industry, and households. Traffic contributes 42% to air pollution in North Rhine-Westphalia, industry 35%, and households 23%. In the industrial sector, sulfur dioxide constitutes 46% of the emissions, particulates 21%, hydrocarbons 12.5%, nitrogen oxides 12.5% and carbon monoxide 8%. A functional relationship exists between density of population and costs of maintaining clean air. Measures for combating air pollution rarely lead to an increase in production despite the additional costs involved. A conflict of interest arises between industry and the individual person. The legislator has to step in through laws and regulations. Laws are now in existence which require the monitoring of air pollution and the reduction of emissions to certain limits.

11076 APTIC NO. 28706

AN URGENT PROGRAM FOR ENVIRONMENTAL PROTECTION PASSED BY THE FEDERAL GERMAN GOVERNMENT.

(Sofortprogramm der Bundesregierung fuer den Umweltschutz). Text in German. Staedtehygiene (Uelzen/Hamburg), 22(1):2-4, 1971.

On September 17, 1970, the West German Government passed the 'urgent' program for environmental protection suggested by its committee for environmental matters. As the initial step in the program, measures are proposed for selected pressing problems concerning environmental hygiene: contamination of air and water, noise, the balance of nature, the preservation of natural regions, the care of landscapes, and technical environmenta research. According to this program, all measures for protecting the spheres of human life, as well as life of plants and animals, against injurious effects of technology are considered as 'environmental hygiene.' The government of the Federal Republic is convinced that regulations by themselves against impending dangers are inadequate to protect the environment. Emphasis will be given instead to the development of technology capable of exerting an influence on water, soil, and air.

11077 APTIC NO. 28731

Environmental Disruption Prevention Corp. (Japan)

AID AVAILABLE FROM ENVIRONMENTAL DISRUPTION PREVENTION CORPORATION AND OTHERS.

(Kogai boshi jigyodan to no josei). Text in Japanese. Preprint, Japan Environmental Hygiene Center, Tokyo, (Japan), 12p., 1970. (Presented at the Japan Environmental Hygiene Center Public Nuisance Seminar, 1970.)

The activities of the Environmental Disruption Prevention Corporation (Kogai Boshi Jigyodan), established October 1965 in accordance with the Environmental Disruption Prevention

Corporation Law are described. The corporation's activites are directed toward the installation and transfer of collective environmental disruption prevention facilities, the installation and transfer of cooperative (common-use) building, reclamation and trasnfer of land lots for relocation of factories and plants, and installation and transfer of common-use welfare facilities. The corporation provides loans to finance the construction and installation of collective and individual environmental disruption prevention equipment and facilities. Payment activity is based on the Special Act for Relief of Those Suffering from Injured Health Caused by Environmental Disruption. The Corporation installs various E.D. prevention facilities for common use by a group of enterprises operating in close proximity. The facilities will be transferred to the users at a long-term low-interest easy payment. The facilities include dust collectors, secondary water treatment devices such as waste-water scrubbers, high-elevated chimneys for effective diffusion of smoke, settlement basin, sewage treatment devices, vehicles to transport wastes, and drainage systems. Common-use building or factory apartment buildings are also constructed and transferred to users at a long-term, low-interest easy payment. Land reclaimed for relocation of factories is transferred the same way.

SOCIAL ASPECTS

11078 APTIC NO. 28593

Kapp, K. William

ENVIRONMENTAL DISRUPTION: GENERAL ISSUES AND METHODOLOGICAL PROBLEMS.

Soc. Sci. Inform., 9(4):15-32, 1970. 19 refs. (Presented at the International Symposium on Environmental Disruption in the Modern World: A challenge to Social Scientists, Tokyo, Japan, March 8-14, 1970.)

Science and technology and their application under given institutional arrangements have led to a serious deterioration of man's natural and social environment. The mastery and control of the resulting hazards to human health and life can be achieved, if at all, only by making science and technology accountable to society, perhaps by making substantial changes in institutional arrangements, and by emphasising a direct ex-ante-approach to control in contrast to current attempts at remedial action by the indirect methods of tax-exemptions, subsidies, and the levying of charges according to the flow of pollutants. (Author conclusion modified)

11079 APTIC NO. 28682

Gustavson Reuben G.

WHAT ARE THE COSTS TO SOCIETY? Public Health Service, Washington, D. C., Proc. Natl. Conf. Air Pollution, Washington, D. C., 1958, p. 41-44. (Nov.)

Examination of human activity for long periods of time reveals that a pattern is established, remains constant, and is followed by grumblings which eventually develop into a revolution. This is succeeded by a period of uncertainty which gradually begins to move into a period of insight. This is the situation in regard to air pollutants. We are now in the period of uncertainty, of gathering information. We know what in the atmosphere gives rise to pollution, and where it came from. We have rough estimates of costs, perhaps $4 billion a year, but this does not begin to take into consideration many of the secondary costs. For example, we do not know much about the temperatures and chemical dynamics of the combustion chamber in the automobile cylinder. More basic research is needed. Man must recognize that he is an animal that pollutes his nest as do few other animals. Government and private industry must put their heads together so that, following a period of uncertainty, we may have insight into the solution of a problem whose costs are not too definitely known, but are indeed large.

GENERAL

11080 APTIC NO. 28000

Horiuchi, Kazuya

ENVIRONMENTAL DISRUPTION AND PUBLIC HEALTH.

(Kogai to koshueisei). Preprint, Japan Environmental Hygiene Center, Tokyo (Japan), 5p., 1970. Text in Japanese. (Presented at the Japan Environmental Hygiene Center Public Nuisance Seminar, 1970.)

The propagation sequence of environmental disruption harmful to human health is compared to that of communicative diseases; three main factors, including sources of generation, opportunity for contact, and individual sensitivity (vulnerability) combine to result in a health-injured individual, a victim of environmental disruption. In the case of communicative diseases, one can effectively prevent infection by keeping oneself away from infected individuals or by getting oneself immunized to such a disease. However, there is no way to take such measures or become immunized in cases of air and water pollution or other environmental disruptions. The first thing to do in connection with prevention of environmental disruption is the check the source of generation, just like removing the source of infection in case of a communicative disease. This measure is the best and most effective. It is feasible technically only if those concerned have serious concerns over the health of citizens. For instance, non or low-sulfur fuel is not difficult to secure, and the steady progress of desulfurization techniques could solve the sulfur dioxide problem. It would not be difficult to find ways to reduce emission of deleterious gas to such an extent that human health may not be adversely affected, if only the technical and management staff of industrial firms show as much enthusiasm for th development of desulfurization devices as they do in manufacturing techniques. To keep the density of air or water pollution below the legally specified level by means of purification devices is considered a solution of mediocre value and should only be used to supplement the first measure, namely, removing the source.

11081 APTIC NO. 28068

Bouquiaux, J.

AIR POLLUTION TRACEABLE TO FUELS: ITS PREVENTION ITS MONITORING.

(La pollution atmospherique par les combustibles; sa prevention; sa surveillance). Text in French. Arch. Belges Med. Social Hyg., Med. Travail Med Legale (Brussels), 28(6):593-410 June 1970. 6 refs.

The conditions under which pollutants are produced by the combustion of fuels, their action on animal and plant life and on materials, the means by which such pollution can be prevented, and the means of surveillance commonly used to study this type of pollution are described. Among the types of pollutants discussed are carbon monoxide, sulfur dioxide, nitrogen oxides, various organic products such as the aldehydes and aromatic polycyclic hydrocarbons, dusts and aerosols, lead compounds, and photochemical smog. Pollution can be combatted in three ways: processing of the fuel before burning, improvement of burners and heating equipment, purification of waste gases before release. A general description is also given of zoning laws, other legal means of regulation, and educational programs. Surveillance is exercised at 2 levels: at the source and in the general environment. In years 1950-1951, the loss per capita per year in the United States due to the total effects of pollution on health, civilization, building materials, meteorological conditions, etc. amounted to $10, or a total of 1 1/2 billion dollars for the entire country. Similar per capita figures are given for Great Britain and France.

11082 APTIC NO. 28168

Nakano, Michio

MANY ASPECTS OF THE LECTURE OF THE 11TH ANNUAL MEETING OF THE JAPAN SOCIETY OF AIR POLLUTION, 1970.

(Shinkyokumen ni taishosuru taikiosen taisaku no eichi--dai 11 kai taikiosen kenkyu zenkoku kyogikai taikai repoto). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 7(1):57-69, Jan. 1971.

Summaries are presented of the topics discussed at the 1970 meeting of the Japanese Air Pollution Society. Guest speakers addressed the meeting on the problems of the health effects of pollution, photochemical smog, and the control of pollution sources scattered over a wide area. Of 210 reports presented to the meetin 65 pertained to methods of measurement and analysis; 38 to meteorology and diffusion; 24 to the control of pollutant sources; 40 to local pollution; and 24 to automobile exhaust gas. A panel discussion centered on the work to be done to achieve the reduction in air pollution planned for 1975. Measures that must be taken include the control of land use and factory sites, the improvement of control facilities, and the establishment of monitoring systems. Further, an overall abatement program involving the cooperation of local government, citizens, and industry must be established.

11083 APTIC NO. 28687

COMMITTEE FOR TECHNOLOGICAL ACTION AGAINST AIR POLLUTION 1965-1968. (Comite d'Action technique contre la Pollution atmospherique, 1965-1968). Text in French. 112p., 1969.

This extensive report of an interdisciplinary commission of the French government reviews the entire field of air pollution, including legislation, measurement techniques, dispersion problems, increased power consumption; solid, liquid, and gaseous fuels; electric power production, domestic heating equipment, improved combustion, central heating plants, industrial wastes, solid waste disposal, dust separators, elimination of polluting gases and odors, and city planning. The first of these reports appeared in 1962. A milestone was reached in France with the creation in 1966 of a Committee for Coordinating Associations for the Prevention of Air Pollution. An air pollution law was passed in 1961, followed by an administrative decree in 1963 and some additional rulings in 1964. Despite the increase in demands for power, pollution emissions have been reduced, due to the discovery of a number of natural gas wells in Europe and rapid developments in the preparation of distilled liquid fuels with a low content of sulfur. The most serious industrial pollution problems in France are to be found in the valleys of the Seine and the Rhone, where half of the 6 million people of France live. The problems of what to do with the emerging megalopolis are basic to the continuing campaign against environmental pollution.

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